Confidential

EPSON

One-Station Printer

TM-U230 series

Specification

STANDARD	
Rev. No.	D
Notes	

Copied Date	
Copied by	

SEIKO EPSON CORPORATION

MATSUMOTO MINAMI PLANT
2070 KOTOBUKI KOAKA, MATSUMOTO-SHI, NAGANO, 399-8702 JAPAN
PHONE(0263)86-5353 FAX(0263)86-9925

Confidential

REVISION SHEET

The table below indicates which pages in this specification have been revised.
Before reading this specification, be sure you have the correct version of each page.

Revisions		Design Section			Sheet Rev. No.					
Rev.	Document	WRT	CHK	APL	Sheet	Rev.	Sheet	Rev.	Sheet	Rev.
A	Enactment	Fujimori	--	Kasai	I	D	19	D	45	D
B	Change	Kato	--	Kasai	II	D	20	D	46	D
C	Change	Ikeya	Nishizawa	Omura	III	D	21	D	47	D
D	Change	Kato	--	Takizawa	IV	D	22	D	48	D
					V	D	23	D	49	D
							24	D	50	D
							25	D	51	D
							26	D	52	D
					1	D	27	D	53	D
					2	D	28	D	54	D
					3	D	29	D	55	D
					4	D	30	D	56	D
					5	D	31	D	57	D
					6	D	32	D	58	D
					7	D	33	D	59	D
					8	D	34	D	60	D
					9	D	35	D	61	D
					10	D	36	D	62	D
					11	D	37	D	63	D
					12	D	38	D	64	D
					13	D	39	D	65	D
					14	D	40	D	66	D
					15	D	41	D	67	D
					16	D	42	D	68	D
					17	D	43	D	69	D
					18	D	44	D	70	D

TITLE	Front Part							
	Cover	Rev. Sheet	Scope	General Description	Table of Contents	Contents	Appendix	Total
TM-U230 series Specification (STANDARD)	1	4	-	2	3	124	14	148

Confidential

REVISION SHEET

The table below indicates which pages in this specification have been revised.
Before reading this specification, be sure you have the correct version of each page.

Revisions		Design Section			Sheet Rev. No.					
Rev.	Document	WRT	CHK	APL	Sheet	Rev.	Sheet	Rev.	Sheet	Rev.
A	Enactment				71	D	97	D	123	D
B	Change				72	D	98	D	124	D
C	Change				73	D	99	D		
D	Change				74	D	100	D	App.1	D
					75	D	101	D	App.2	D
					76	D	102	D	App.3	D
					77	D	103	D	App.4	D
					78	D	104	D	App.5	D
					79	D	105	D	App.6	D
					80	D	106	D	App.7	D
					81	D	107	D	App.8	D
					82	D	108	D	App.9	D
					83	D	109	D	App.10	D
					84	D	110	D	App.11	D
					85	D	111	D	App.12	D
					86	D	112	D	App.13	D
					87	D	113	D	App.14	D
					88	D	114	D		
					89	D	115	D		
					90	D	116	D		
					91	D	117	D		
					92	D	118	D		
					93	D	119	D		
					94	D	120	D		
					95	D	121	D		
					96	D	122	D		

TITLE	Front Part					Contents	Appendix	Total
	Cover	Rev. Sheet	Scope	General Description	Table of Contents			
TM-U230 series Specification (STANDARD)	1	4	-	2	3	124	14	148

REVISION SHEET

Confidential

REV.	SHEET	CHANGED CONTENTS
B	All	TM-U230/TM-U230P → TM-U230 series, All pages are renumbered.
	II	Features (for model with coating only) (added)
	III-V	Table of contents (changed)
	6	1.9 Electrical Characteristics Description about internal buzzer (added) 1.10 EMI and Safety Standards Applied (changed)
	8	1.12 Environmental Specifications 5) Spillproof (added)
	21-28	2.1.3 Ethernet Interface (added)
	29	2.2.1 Interface Connectors 3) 10Base-T Ethernet interface model (added)
	30	2.2.3 Drawer kick-out connector Description about annunciator (deleted)
	33	3.1 Commands ESC (A (added)
	47	3.3.3 DIP switches 3) Ethernet interface model (added)
	48	3.4.2 Internal Buzzer (added)
	54	4.3 Finish (for model with coating only) (added)
	59	5.1 Standard Accessories (changed)
	60	5.2 Options (changed)
	64	CR [Description] Ethernet interface (added)
		DLE EOT [Description] • This command is executed (deleted) · • With the parallel interface … (deleted) • This command is … (added) • It depends on … (added)
	67	DLE ENQ [Description] • This command is … (deleted) • It depends on … (added)
	72-76	ESC (A (added)
	88	ESC c 3 [Details] • This command is available … (deleted) · • The detector is switched … (deleted) • The timing to detect … (added)
	100	GS a [Details] • With the Ethernet interface … (added)
	102	[Default] When the Ethernet interface … (added)
	App.4	5) Fine coating (for model with coating only) (added)
	App.14	APPENDIX F (added)

TITLE

TM-U230 series

Specification

(STANDARD)

Confidential

REVISION SHEET

REV.	SHEET	CHANGED CONTENTS
C	All	All pages are renumbered.
	1, 2	1.2 Character Specifications Kanji character models (added)
	34	3.1.2 List of Kanji commands for the Japanese, Chinese, Taiwanese, and Korean models (added)
	41-43	3.2.7 Page6, 3.2.8 Page 7, 3.2.9 Page 8 (added)
	45-51	3.2.11 Page 20 through 3.2.17 Page 26 added
	52,54	3.2.8 → 3.2.18, 3.2.9 → 3.2.19, 3.2.10 → 3.2.20
	104	ESC t 6 ≤n≤ 8, 20 ≤n≤ 26 (added)
	117-124	Kanji commands (added)
	App.13	APPENDIX E: n=65 to 68 → n=65 to 69
D	All	All pages are renumbered.
	8	1.12 Environmental Specifications 5) Spillproof: IP-32 → equivalent to IP32
	9	1.13 Printer Installation Position …. Does not tilt move than 15° → does not tilt. NOTES: 1. (deleted) 2. → 1. 3. → 2.
	56	Table 3.3.4 DIP Switch 2 Default of SW No.2 Off → On Default of SW No.3 Off → On
	57	Table 3.3.6 DIP Switch 2 Default of SW No.2 Off → On Default of SW No.3 Off → On
	63	3.8.1 Detectors and LED indicators (The paper roll end …. automatically.) (deleted)
	64–68	4.3 Finish transparent (deleted) Figure 4.3.1 – Figure 4.3.5 (changed)
	70	5.2 Options PS-170, PA-6508, PA-6511, PA-6513, PB-6509, PB-6510 (deleted)

TITLE

TM-U230 series

Specification

(STANDARD)

Confidential

CONFIDENTIALITY AGREEMENT

BY USING THIS DOCUMENT, YOU AGREE TO ABIDE BY THE TERMS OF THIS AGREEMENT. PLEASE RETURN THIS DOCUMENT IMMEDIATELY IF YOU DO NOT AGREE TO THESE TERMS.

1. This document contains confidential, proprietary information of Seiko Epson Corporation or its affiliates. You must keep such information confidential. If the user is a business entity or organization, you must limit disclosure to your employees, agents, and contractors who have a need to know and who are also bound by obligations of confidentiality.
2. On the earlier of (a) termination of your relationship with Seiko Epson, or (b) Seiko Epson's request, you must stop using the confidential information. You must then return or destroy the information, as directed by Seiko Epson.
3. If a court, arbitrator, government agency, or the like orders you to disclose any confidential information, you must immediately notify Seiko Epson. You agree to give Seiko Epson reasonable cooperation and assistance in resisting disclosure.
4. You may use confidential information only for the purpose of operating or servicing the products to which the document relates, unless you obtain the prior written consent of Seiko Epson for some other use.
5. Seiko Epson warrants that it has the right to disclose the confidential information. SEIKO EPSON MAKES NO OTHER WARRANTIES CONCERNING THE CONFIDENTIAL INFORMATION OR ANY OTHER INFORMATION IN THE DOCUMENT, INCLUDING (WITHOUT LIMITATION) ANY WARRANTY OF TITLE OR NON-INFRINGEMENT. Seiko Epson has no liability for loss or damage arising from or relating to your use of or reliance on the information in the document.
6. You may not reproduce, store or transmit the confidential information in any form or by any means (electronic, mechanical, photocopying, recording, or otherwise) without the prior written permission of Seiko Epson.
7. Your obligations under this Agreement are in addition to any other legal obligations. Seiko Epson does not waive any right under this Agreement by failing to exercise it. The laws of Japan apply to this Agreement.

CAUTIONS

1. This document shall apply only to the product(s) identified herein.
2. No part of this document may be reproduced, stored in a retrieval system, or transmitted in any form or by any means, electronic, mechanical, photocopying, recording, or otherwise, without the prior written permission of Seiko Epson Corporation.
3. The contents of this document are subject to change without notice. Please contact us for the latest information.
4. While every precaution has been taken in the preparation of this document, Seiko Epson Corporation assumes no responsibility for errors or omissions.
5. Neither is any liability assumed for damages resulting from the use of the information contained herein.
6. Neither Seiko Epson Corporation nor its affiliates shall be liable to the purchaser of this product or third parties for damages, losses, costs, or expenses incurred by the purchaser or third parties as a result of: accident, misuse, or abuse of this product or unauthorized modifications, repairs, or alterations to this product, or (excluding the U. S.) failure to strictly comply with Seiko Epson Corporation's operating and maintenance instructions.
7. Seiko Epson Corporation shall not be liable against any damages or problems arising from the use of any options or any consumable products other than those designated as Original EPSON Products or EPSON Approved Products by Seiko Epson Corporation.

TRADEMARKS

EPSON® and ESC/POS® are registered trademarks of Seiko Epson Corporation.

General Notice: Other product and company names used herein are for identification purposes only and may be trademarks of their respective companies.

Confidential

This specification applies to the TM-U230 series.

Features

This printer was developed on the basis of the high performance/low-cost ratio design concept.

This printer is a one-station printer that is light and offers excellent reliability. The design of this printer also emphasizes the satisfaction of user needs for use in the kitchen.

- Compact and lightweight.
- High-speed printing through logic-seeking control.
- Excellent reliability and long life due to adoption of a stepping motor both for moving the carriage and for paper feeding.
- Flexible paper feed pitch setting permits printing of any user-defined format.
- Conforms to ESC/POS®; excellent universality of control.
- Selectable character fonts (7×9, 9×9).
- Semi-automatic paper loading capability.
- AC adapter provides a compact power supply.
- Automatic status back (ASB) function that automatically transmits changes in printer status.
- Two-color printing (black and red) (2-color print version only).
- Built-in autocutter.
- Autocutter control comand to save paper.
- Maximum 16 KB of the receive buffer is available.
- Can be installed vertically, horizontally, or hanging on the wall with the WH-10 hanging bracket.
- The surface of the case has a fine coating (for model with coating only).
- Built-in buzzer can tell paper out (ganged control with PAPER OUT LED).

These and other features make this printer highly suitable for the kitchen printer market.

Confidential

TABLE OF CONTENTS

1. BASIC SPECIFICATIONS 1
- 1.1 Printing Specifications 1
- 1.2 Character Specifications 1
- 1.3 Ribbon Cassette 3
- 1.4 Roll Paper Supply Unit 4
- 1.5 Paper Specifications 4
- 1.6 Autocutter 4
- 1.7 Printing Area 5
- 1.8 Receive Buffer 5
- 1.9 Electrical Characteristics 5
- 1.10 EMI and Safety Standards Applied 6
- 1.11 Reliability 7
- 1.12 Environmental Specifications 8
- 1.13 Printer Installation Position 9

2. CONFIGURATION 10
- 2.1 Interface Specifications 10
  - 2.1.1 RS-232 serial interface 10
  - 2.1.2 IEEE 1284 bidirectional parallel interface (parallel Iinterface specifications) 15
  - 2.1.3 Ethernet Interface 21
- 2.2 Connectors 29
  - 2.2.1 Interface connectors 29
  - 2.2.2 Power supply connector 30
  - 2.2.3 Drawer kick-out connector (modular connector) 30

3. FUNCTIONS 33
- 3.1 Commands 33
  - 3.1.1 List of commands for all printer models 33
  - 3.1.2 List of Kanji commands for the Japanese, Chinese, Taiwanese, and Korean models 34
- 3.2 Character Code Tables 35
  - 3.2.1 Page 0 (PC437: U.S.A. Standard Europe) (International character set: U.S.A.) 35
  - 3.2.2 Page 1 (Katakana) 36
  - 3.2.3 Page 2 (PC850: Multilingual) 37
  - 3.2.4 Page 3 (PC860: Portuguese) 38
  - 3.2.5 Page 4 (PC863: Canadian-French) 39
  - 3.2.6 Page 5 (PC865: Nordic) 40
  - 3.2.7 Page 6 (Hiragana) (Available on the Kanji model) 41
  - 3.2.8 Page 7 (One-pass printing Kanji characters) (Available on the Kanji model) 42
  - 3.2.9 Page 8 (One-pass printing Kanji characters) (Available on the Kanji model) 43
  - 3.2.10 Page 19 (PC858:Euro) 44
  - 3.2.11 Page 20 (Thai Character Code 42) 45
  - 3.2.12 Page 21 (Thai Character Code 11) 46
  - 3.2.13 Page 22 (Thai Character Code 13) 47
  - 3.2.14 Page 23 (Thai Character Code 14) 48
  - 3.2.15 Page 24 (Thai Character Code 16) 49
  - 3.2.16 Page 25 (Thai Character Code 17) 50
  - 3.2.17 Page 26 (Thai Character Code 18) 51
  - 3.2.18 Page 254 (space page) 52
  - 3.2.19 Page 255 (space page) 53
  - 3.2.20 International character sets 54
- 3.3 Switches and Buttons 55

3.3.1 Power switch....55
3.3.2 Panel buttons....55
3.3.3 DIP switches....55
3.4 Panel LED Indicators....58
3.4.1 Panel LED indicators....58
3.4.2 Internal Buzzer....58
3.5 Error Processing....59
3.5.1 Error types....59
3.5.2 Operation when an error is detected....60
3.5.3 Data reception error....60
3.6 Self-test....61
3.7 Hexadecimal Dump....62
3.8 Paper Detectors....63
3.8.1 Detectors and LED indicators....63
3.8.2 Detectors and printing....63
3.9 Cover open detector....63
3.10 Buffer-full Printing....63
3.11 Loading the Paper Roll....63

4. CASE SPECIFICATIONS....64
4.1 External Dimensions and Mass....64
4.2 Color....64
4.3 Finish....64
4.4 External Appearance....64

5. ACCESSORIES AND OPTIONS....69
5.1 Standard Accessories....69
5.1.1 AC adapter PS-180 External Dimensions and Mass....69
5.2 Options....70
5.3 Interface Board....70

6. COMMANDS....71
6.1 Command Notation....71
6.2 Explanation of Terms....71
6.3 Command Descriptions....73
HT....73
LF....73
CR....74
DLE EOT *n*....74
DLE ENQ *n*....77
ESC SP *n*....78
ESC ! *n*....78
ESC % *n*....79
ESC & y *c1 c2 [x1 d1...d(y × x1)]...[xk d1... d(y × xk)]*....80
ESC (A *pL pH fn [parameter]*....82
<Function 97> ESC (A *pL pH fn n c t1 t2*....83
<Function 98> ESC (A *pL pH fn a b n c t1 t2*....84
<Function 99> ESC (A *pL pH fn a b n c t1 t2*....86
ESC . *m nL nH d1...dk*....88
ESC – *n*....89
ESC 2....90
ESC 3 *n*....90
ESC <....90
ESC = *n*....91
ESC ? *n*....92

ESC @ 92
ESC D *n1... nk NUL* 93
ESC E *n* 94
ESC G *n* 94
ESC J *n* 95
ESC K *n* 95
ESC R *n* 96
ESC U *n* 97
ESC a *n* 98
ESC c 3 *n* 99
ESC c 4 *n* 100
ESC c 5 *n* 101
ESC d *n* 101
ESC e *n* 102
ESC p *m t1 t2* 102
ESC r *n* 103
ESC t *n* 104
ESC { *n* 105
GS (A *pL pH n m* 106
GS I *n* 107
① GS V *m*, ② GS V *m n* 109
GS a *n* 111
GS r *n* 113
GS z 0 *t1 t2* 115
FS ! *n* 117
FS & 118
FS - *n* 118
FS 119
FS 2 *c1 c2 d1...dk* 120
FS ? *c1 c2* 122
FS C *n* 123
FS S *n1 n2* 124

APPENDIX A: MISCELLANEOUS NOTES App.1
APPENDIX B: REMAINING ROLL PAPER ADJUSTMENT App.6
APPENDIX C: NOTES ON CHARACTER PRINTING App.8
APPENDIX D: NOTES ON USING THE DRAWER KICK-OUT CONNECTOR App.10
APPENDIX E: TRANSMISSION STATUS IDENTIFICATION App.13
APPENDIX F: NOTES ON RECEIVING REAL-TIME COMMANDS App.14

Confidential

1. BASIC SPECIFICATIONS

1.1 Printing Specifications

1) Printing method: Serial impact dot matrix

2) Head wire configuration: 9-pin serial configuration

3) Printing directions: Bi-directional printing (logical seeking)

4) Printing speed: Approx. 3.5 lps (printing 40 column per line with 16 cpi)
Approx. 6.4 lps (printing 16 column per line with 16 cpi)
(except data transmission and processing time)
[lps: lines per second]
[cpi: characters per 25.4 mm {1"}]

NOTES: 1. If the printing duty ratio is too high, the operation of the print head is stopped by the duty limit. In such circumstances, the printing speeds shown above cannot be guaranteed.
2. When red-color or 2-color (black/red) combination printing is selected, the printing speed is less than the black-color printing speed. This is caused by the switching operation in the printer.

5) Characters per line: Refer to Table 1.2.1.

6) Characters per inch: Refer to Table 1.2.1.

7) Printing duty ratio: Refer to Appendix A.

8) Two-color printing (2-color print version only):
Black and red colors are selectable.

1.2 Character Specifications

1) Number of characters: Alphanumeric characters: 95
Extended graphics: 128 × 12 pages (including one space page)
International characters: 37

The Kanji character model supports printing with one of the following characters:

① Japanese Kanji (Two-pass printing font)
JIS (JIS X0208-1990) Level 1, Level 2

② Chinese Kanji (Two-pass printing font)
7580 (GB2312)
Using the GB5199 of the Chinese national standard font.

③ Taiwanese Kanji (Two-pass printing font)
13494 (Big 5)

④ Korean Kanji (Two-pass printing font)
8223 (KS C5601 type)

⑤ Thai character (3-pass printing font)
128 characters × 7 pages (133 character types)

2) Character structure: 7 × 9
9 × 9
16 × 16 (Kanji, Korean Kanji)
7 × 27 (Thai characters)
9 × 27 (Thai characters)

3) Character size: Refer to Table 1.2.1

Table 1.2.1 Character Dimensions, Characters Per Inch, Characters Per Line

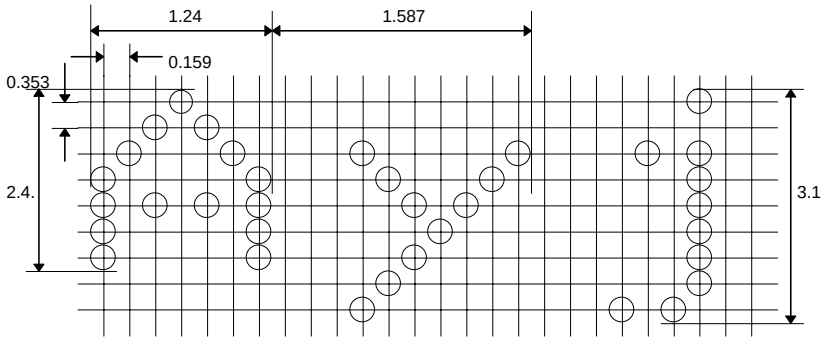
Character configuration		Character dimensions W × H (mm)	Dot spacing between characters	Characters per line (cpl)	Characters per 25.4 mm {1"} (cpi)
Horiz. × Vert.	Character type				
7 × 9	ANK	1.2 × 3.1	3 half dots	40	16
	Graphics	1.7 × 3.1	0	40	16
9 × 9	ANK	1.6 × 3.1	3 half dots	33	13.3
	Graphics	2.0 × 3.1	0	33	13.3
7 × 9	ANK	1.2 × 3.1	2 half dots	42	17.8
	Graphics	1.6 × 3.1	0	42	17.8
9 × 9	ANK	1.6 × 3.1	2 half dots	35	14.5
	Graphics	1.9 × 3.1	0	35	14.5
9 × 9	Kanji	2.7 × 2.7	0	25	9.5
	Korean Kanji		2	22 (*1)	8.9
7 × 27	Thai characters	1.2 × 9.5	3 half dots	40	16
9 × 27	Thai characters	1.6 × 9.5	3 half dots	33	13.3
7 × 27	Thai characters	1.2 × 9.5	2 half dots	42	17.8
9 × 27	Thai characters	1.6 × 9.5	2 half dots	35	14.5

(*1) Selectable by software command (default value is 22)

NOTE: The default font is 7 × 9; the dot spacing between characters for 3 half-dots or 2 half-dots can be set by changing the DIP switch settings.

ANK = Alphanumeric characters

Example: 7 × 9 font (with three-dot spacing)



[Units: mm]

Figure 1.2.1 7 × 9 Font

1.3 Ribbon Cassette

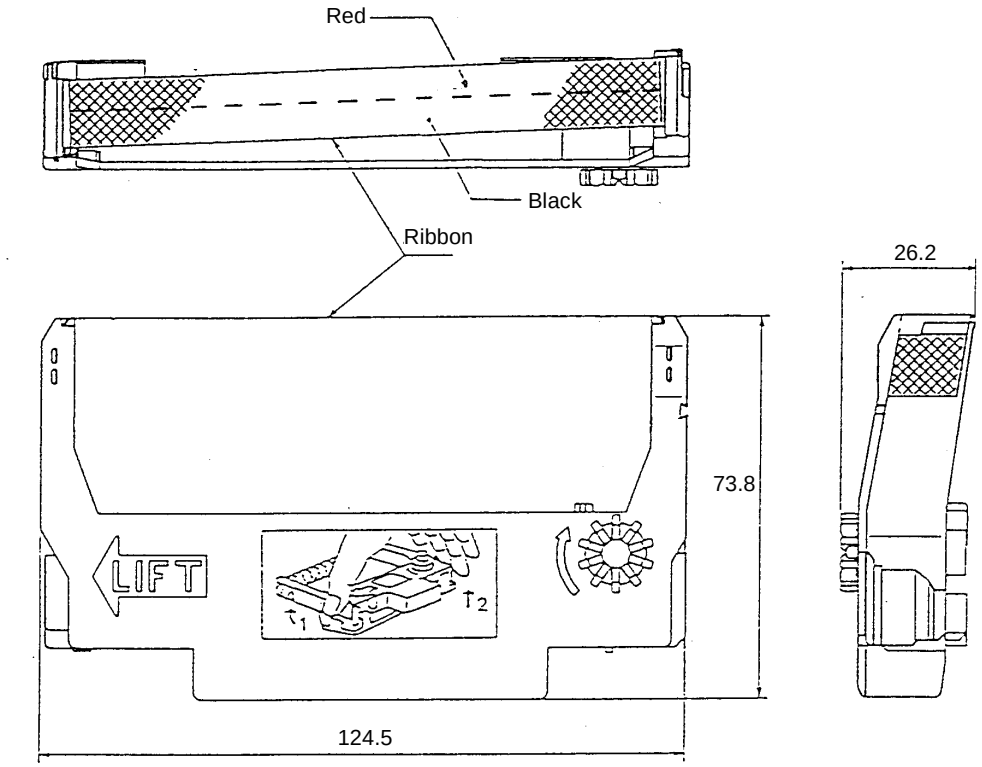
1) Special ribbon cassettes

Model No.	Color	Ribbon life (*1)
ERC-38 (P)	Purple	4 million characters (with continuous printing at 25°C {77°F})
ERC-38 (B)	Black	3 million characters (with continuous printing at 25°C {77°F})
ERC-38 (B/R)	Black/Red	Black: 1.5 million characters (with continuous printing at 25°C {77°F}) Red: 750,000 characters (with continuous printing at 25°C {77°F})

*1: The ribbon life is based on the following conditions:

- Character font: 7 × 9 font (with descenders)
- Printing pattern: ASCII 96-character rolling pattern
  Refer to the printing example for the printing pattern
  ERC-38 (P)/(B): Appendix Figure A-1
  ERC-38 (B/R): Appendix Figure A-2
  25°C {77°F}

2) External view of ribbon cassette:
Refer to Figure. 1.3.1.



[Units: mm]

Figure 1.3.1 External View of ERC-38 (B/R)

NOTE: Malfunctions and other problems may arise if a ribbon other than the specified ribbon cassette is used. Seiko Epson does not warrant against problems arising from the use of ribbons other than the specified one.

1.4 Roll Paper Supply Unit

1) Supply method: Drop-in method

2) End detector

a) Detection method: By mechanical microswitch

b) Detection position: Positioned within the paper path for the roll paper; detects the end of the roll paper

3) Near end detector

a) Detection method: By mechanical microswitch

b) Inner diameter of the paper roll core:
10.5 to 12.5 mm (Refer to Appendix B for details.)

1.5 Paper Specifications

1) Paper feeding method: Friction feed

2) Paper feed interval: Initial setting: Approximately 4.23 mm {1/6"}
Can be set in units of approximately 0.176 mm {1/144"} by command.

3) Paper feed speed: Approximately 4.17 inches/second (25 lps)
(during continuous feeding)
[lps: lines per second]

4) Paper dimensions:

a) Paper roll

Width	76 ± 0.5 mm {3 ± 0.02"}
Maximum diameter	83 mm {3.27"}
Core	When there is no near-end detector, always be sure to use a paper roll that is not glued to the core

①A Normal paper

Paper thickness	1 sheet 0.06 to 0.085 mm {0.0024 to 0.0033"}
Weight	52.3 to 64 g/m^2 {14 to 17 lb} (45 to 55 kg/1000 sheets/1091 x 788 mm)

1.6 Autocutter

Partial cut is executed by command.
Partial cut: Cutting with one point left uncut

1.7 Printing Area

1) Roll paper

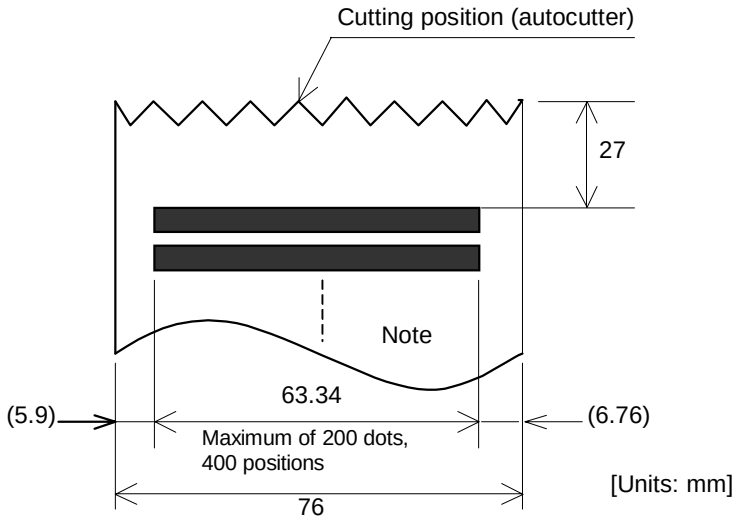


Figure 1.7.1 Printing Area

NOTE: The values shown for the printing area are the values calculated (between dot centers) based on the wire diameter (0.29 mm {0.0011"}).

1.8 Receive Buffer

Either 16KB or 1KB can be selected by DIP switch.

1.9 Electrical Characteristics

1) Supply voltage: +24 VDC ± 10%

NOTE: If any one of the following power supplies PA-6508, PA-6511, PA-6513, PB-6509, or PB-6510 is used, the supply voltage is approximately 24 – 34 V.

2) Power consumption (when the AC adapter PS-180 is used):

Operating:	Mean:	Approximately 1.0 A (character font 7 × 9, α-N printing)
	Peak:	Approximately 2.5 A
Standby:	Mean:	Approximately 90 mA (when the internal buzzer is off)
		Approximately 100 mA (when the internal buzzer is on)

1.10 EMI and Safety Standards Applied

1) Printer

(EMC is measured using SEIKO EPSON's AC adapter PS-180, PS-170, PA-6508, PA-6511, PA-6513, PB-6509, or PB-6510)

Europe:	CE Marking:	Directive 89/336/EEC
		EN55022 Class B
		EN55024
		IEC61000-4-2
		IEC61000-4-3
		IEC61000-4-4
		IEC61000-4-5
		IEC61000-4-6
		IEC61000-4-11
	Safety:	EN60950
North America:	EMI:	FCC/ICES-003 Class A
	Safety:	UL1950/CSA C22.2 No.950
Japan:	EMC:	VCCI Class A
		JEIDA52
Oceania:	EMC:	AS/NZS3548

UL's Conditions of Acceptability

1. This component has been judged on the basis of the required spacings in the Standard for Safety of Information Technology Equipment, Including Electrical Business Equipment, CAN/CSA C22.2 No.950-95 * UL 1950, Third Edition, including revisions through revision date March 1, 1998, which are based on the Fourth Amendment to IEC 950, Second Edition, which would cover the component itself if submitted for Listing.
2. Interface Connector (DK) is not intended for TNV connection.
3. This component must be supplied by a Limited Power Source.
4. The consideration should be given for requring a D.C. Symbol Marking for nature of supply (IEC60417, Symbol No. 5031).

2) AC Adapter: (EMC is adopted together with the TM-U230)

Europe:	CE Marking	Directive 89/336/EEC
		EN55022 Class B
		EN55024
		IEC61000-4-2
		IEC61000-4-3
		IEC61000-4-4
		IEC61000-4-5
		IEC61000-4-6
		IEC61000-4-11
	Safety:	EN60950
North America:	Safety:	UL1950/CSA C22.2 No.950
Japan:	Electrical Appliance and Material Control Law	
Oceania:	Safety:	AS3260

1.11 Reliability

1) Life

Mechanism:	7,500,000 lines
Print head:	150 million characters (using an average of 2 dots/wire per character). (The printing pattern is based on Appendix A,1), Print Duty).
Print color switching:	Refer to Appendix A, 1), Print Duty.
Autocutter:	1,000,000 cuts End of life is defined as the point at which the printer reaches the beginning of the wearout period. Recommended paper must be used.

2) MTBF — 180,000 hours
Failure is defined as a random failure occurring at the time of the random failure period.

3) MCBF — 18,000,000 lines
This is an average failure interval based on failures relating to wearout and random failures up to the life of 7.5 million lines.

1.12 Environmental Specifications

1) Temperature

During operation: 0 to 50°C {41 to 122°F} (At 34°C {93°F} or higher, there are humidity restrictions; refer to Figure 1.12.1.)

During storage: -10 to 50°C {14 to 122°F} (excludes paper and ribbon)

2) Humidity

During operation: 10 to 90% (no condensation)

During storage: 10 to 90% (no condensation; excludes paper and ribbon)

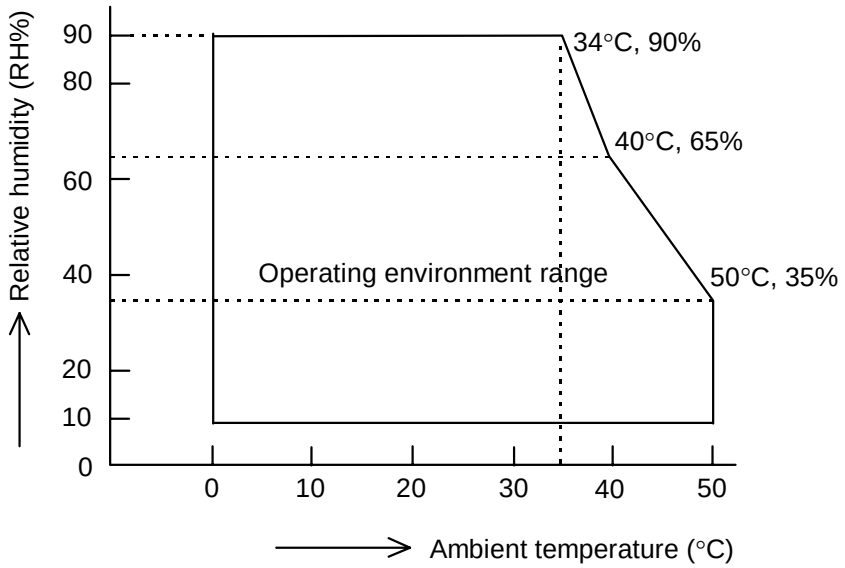


Figure 1.12.1 Operating Temperature and Humidity Range

3) Vibration resistance

While packed:	Frequency	5 to 55 Hz
	Acceleration	Approximately 19.6 m/s^2 {2G}
	Sweep Time	10 minutes (half cycle)
	Directions	One hour X, Y and Z

4) Impact resistance

While packed:	Packaging	Epson's standard packaging
	Height	60 cm {2 feet}
	Directions	1 corner, 3 edges, 6 sides
While not packed:	Height	5 cm {2"}
	Directions	4 sides, supported on one side

5) Spillproof: IEC529 equivalent to IP32 (only for the printer itself)

1.13 Printer Installation Position

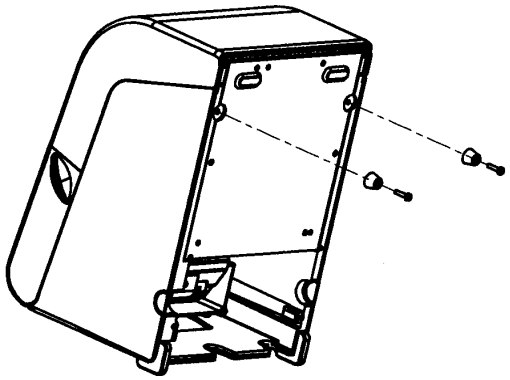
Install the printer vertically as a basic position so that the paper exit faces the front. Make sure that it does not tilt.

The printer also must be installed so that it does not move or vibrate during paper cutting or the drawer kick-out operation.

1) When the printer is installed on a desk

The printer can be installed both in the vertical position so that the paper exit faces the front and in the horizontal position so that the paper exit faces upward.

NOTES:
1. When the printer is installed in the horizontal position, attach the switch panel sheet packed with the printer in the specified location.
2. Change the detection position of the paper roll near-end sensor (refer to Appendix B) and the rubber feet, depending on the printer installation position.



2) When the printer is hanging on the wall

The printer can be installed on the wall with the optional wall hanging bracket.

NOTES:
1. Be sure to use the optional wall hanging bracket (model type: WH-10).
2. Follow the instructions in the installation manual.
3. Set the detection position of the paper roll near-end sensor to the same position as when the printer is installed vertically.
4. If necessary, install the power supply box on the lower part of the printer.

2. CONFIGURATION

2.1 Interface Specifications

2.1.1 RS-232 serial interface

2.1.1.1 Specifications

Data transmission:	Serial
Synchronization:	Asynchronous
Handshaking:	DTR/DSR or XON/XOFF control
Signal levels:	MARK = -3 to -15 V ... logic '1' / OFF SPACE = +3 to +15 V ... logic '0' / ON
Baud rate:	4800, 9600 bps [bps: bits per second]
Data word length:	7 or 8 bits
Parity:	None, even, odd
Stop bits:	1 or more (Data transmitted from the printer has 1 stop bit (fixed))
Connector:	D-SUB 25 (female) or equivalent

2.1.1.2 Online/offline switching

The printer does not have an online/offline button. The printer goes online or offline under the following conditions:

<Conditions to go offline>

1) Between the time when the power is turned on (including reset using the interface) and when the printer is ready to receive data.
2) During the self-test.
3) When the cutter cover is opened.
4) During paper feeding using the FEED button.
5) Between the time when the printer stops printing due to a paper-end and when the online recovery wait time finishes after loading paper.
6) When an error has occurred.

<Conditions to go online>

1) Automatically after the time when the power is turned on (including reset using the interface) when the printer is ready to receive data.
2) Automatically after the self-test.
3) Automatically after the paper feeding is stopped by releasing the FEED button.
4) After the time when the paper loading is completed, using GS z 0 command. The operation differs for each model type.
   (default: t2 =0)
   After the time when the FEED button is pressed while the PAPER OUT LED is blinking after the paper loading is completed.

2.1.1.3 Interface connector terminal assignments and signal functions

Table 2.1.1 Interface Pin Assignments and Functions

Pin No.	Signal Name	Signal Direction	Function
1	FG	–	Frame ground.
2	TXD	Output	Transmit data.
3	RXD	Input	Receive data.
4	RTS	Output	Same as DTR signal (same as pin 20).
6	DSR	Input	Indicates whether the host can receive data. SPACE indicates that the host can receive data, and MARK indicates that the host cannot receive data. When DTR/DSR control is selected, the printer transmits data after checking this signal (except when data is sent by **DLE EOT**, **GS a**). When XON/XOFF control is selected, the printer does not check this signal. Changing the DIP switch setting enables this signal to be used as a reset signal for the printer The printer is reset when the signal remains MARK for 1 ms or more.
7	SG	–	Signal ground
20	DTR	Output	1) When DTR/DSR control is selected, this signal indicates whether the printer is BUSY. SPACE indicates that the printer is READY to receive data, and MARK indicates that the printer is BUSY. DIP switch 1-8 switches conditions for BUSY. The BUSY (MARK) condition is changed using DIP switch 1-8 as follows:

Printer Status		Dip Switch 1-8 Status	
		ON	OFF
Offline	1) The period from power-on (or initialization of the mechanism due to resetting through the interface) until the printer is ready to receive data.	BUSY	BUSY
	2) During the self-test.	BUSY	BUSY
	3) When the cutter cover is opened.		
	4) During paper feeding using the FEED button.	----	BUSY
	5) When the printer stops due to a paper-end (**ESC c 4**).	----	BUSY
	6) During an error condition.	----	BUSY
7) When the receive buffer is full (*1).		BUSY	BUSY

		2) When XON/XOFF control is selected, this signal indicates whether the printer is properly connected and is ready to receive data. SPACE indicates that the printer is properly connected and is ready to receive data. This signal is always SPACE except during the following periods: • From power-on until the printer is ready to receive data. • During the self-test.
25	INIT	Output	Changing the DIP switch setting enables this signal to be used as a reset signal for the printer. The printer is reset when the signal remains SPACE for 1 ms or more.

*1)
- When the remaining space in the receive buffer drops to 128 bytes, the printer status becomes "buffer full" and it remains "buffer full" until the space in the receive buffer increases to 256 bytes.
- The printer ignores the data received when the remaining space in the receive buffer is 0 bytes.

2.1.1.4 XON/OFF transmission timing

When XON/OFF control is selected, the printer transmits XON or XOFF signals as follows. Transmission timing depends on the setting of DIP switch 1-8.

Table 2.1.2 XON/XOFF Transmission Timing

Printer Status		DIP Switch 1-8 Status	
		ON	OFF
[XON transmission]	1) When the printer first goes online after power on or after resetting through the interface.	Transmission	Transmission
	2) When the receive buffer is released from the buffer-full state.	Transmission	Transmission
	3) When the printer status changes from offline to online.	----	Transmission
	4) When the printer recovers from an error through a command.	----	Transmission
[XOFF transmission]	5) When the receive buffer is full.	Transmission	Transmission
	6) When the printer status changes from online to offline.	----	Transmission

NOTES:
- The XON code is <11>H and the XOFF code is <13>H.
- In case 3), XON is not transmitted when the receive buffer is full.
- In case 6), XOFF is not transmitted when the receive buffer is full.

2.1.1.5 Example serial interface connection

Host		Printer
TXD	----------	RXD
DSR	----------	DTR
CTS	----------	RTS
RXD	----------	TXD
DTR	----------	DSR
FG	----------	FG
SG	----------	SG

- When connecting the printer to a DCE (DCE: Data Circuit Terminating Equipment), set the handshaking so that the transmitted data can be received.
- Transmit data to the printer after turning on the power and initializing the printer.

2.1.1.6 Notes on setting DIP switch 1-8 to on

1) The printer mechanism stops but does not become BUSY in the following cases:
   - When an error occurs.
   - When the printer stops printing due to a paper-end.
   - When paper is fed using the FEED button.

2) When handshaking with the printer while using this switch setting, make sure to monitor the printer with the **GS a** command and the ASB function.
   With this switch setting, the default value of the **GS a** command *n* is 2. This automatically transmits the printer status, depending on online/offline changes.

3) When using the **DLE EOT** or **DLE ENQ** command, make sure the receive buffer does not become full.
   - Notes on using a host that cannot transmit data when the printer is BUSY:
     If an error occurs when the receive buffer is full and the printer is BUSY, the **DLE EOT** and **DLE ENQ** commands cannot be used.
   - Notes on using a host that can transmit data when the printer is BUSY:
     If a **DLE EOT** or **DLE ENQ** command is used while sending bit-image data, and the receive buffer-full state is encountered during transmission of the data, the **DLE EOT** or **DLE ENQ** command is processed as bit-image data.
     In addition, the data transmitted during the receive buffer-full state may be lost.

Example:

Set the receive buffer to 16KB, and check the status with **GS r** for each line of printing transmitted. Make sure the data for printing each line does not cause the printer to enter the receive buffer-full state.

2.1.1.7 Notes on resetting the printer using the interface

The printer can be reset through the interface (pins 6 or 25) by changing the DIP switch settings accordingly (Refer to Table 3.3.2).

Table 2.1.3 Switching of the Reset Condition

Pin No.	DIP Switch	Reset Condition
Pin 6 (DSR)	DSW 2-3: ON	MARK input
Pin 25 (INIT)	DSW 2-4: ON	SPACE or TTL-HIGH level voltage signal input

To reset the printer, the conditions given below must be satisfied:

<DC characteristics>

Table 2.1.4 DC Characteristics of the Reset Condition

Item	Symbol	Pin 6 (DSR)	Pin 25 (INIT)
Input HIGH level voltage	V_{IH}	+3 to +15 V	+2 to + 15 V
Input LOW level voltage	V_{IL}	-15 to -3 V	-15 to + 0.8 V
Input HIGH level current	I_{IH}	5 mA (maximum)	1 mA (maximum)
Input LOW level current	I_{IL}	-5.3 mA (maximum)	-2 mA (maximum)
Input impedance	R_{IN}	3 kΩ (minimum)	

<AC characteristics>

Minimum reset pulse width: T_{RS} 1 ms (minimum)

- When pin 6 (DSR) is used:

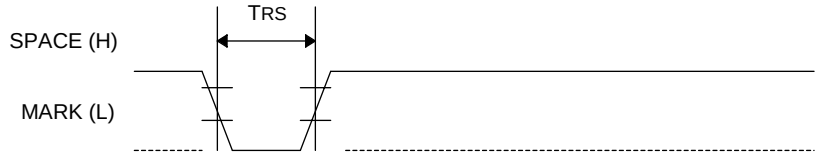


Figure 2.1.1 Reset Minimum Pulse Width (Pin 6)

- When pin 25 (INIT) is used:

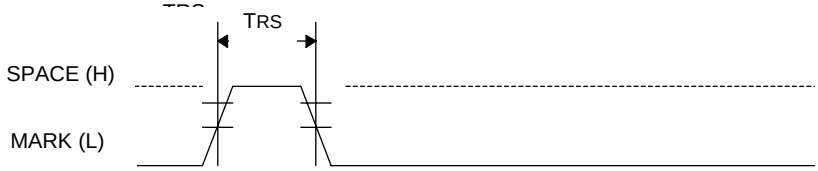


Figure 2.1.2 Reset Minimum Pulse Width (Pin 25)

NOTES: 1. Correct printer operation is not guaranteed unless the signals meet the above stated conditions. The above conditions must also be met when TTL signals are used to drive the DSR and INIT reset pins. Although a signal is input to pin 6 (DSR) at the TTL level, according to the DC characteristics described above, the operation is not guaranteed and pin 6 cannot be controlled.

2. When pin 6 (DSR) and pin 25 (INIT) are open, the printer is operating.

2.1.2 IEEE 1284 bidirectional parallel interface (parallel linterface specifications)

Copyright© 1994 by the Institute of Electrical and Electronic Engineers, Inc.

2.1.2.1 Specifications

Data transmission:	8-bit parallel
Synchronization:	Externally supplied nStrobe signals
Handshaking:	nAck and Busy signals
Signal levels:	TTL compatible
Connector:	57RE-40360-830B (DDK) or equivalent (IEEE 1284 Type B)

Reverse communication (from printer to host): Nibble or Byte Mode

NOTE: The letter “n” in front of a signal name indicates active LOW.

2.1.2.2 Switching between online and offline

The printer is not equipped with any online/offline switch. The printer is placed in offline status in any of the following conditions:

- When the power is turned on or until the printer becomes ready for data transmission after it is initialized by the reset signal (nInit) from the interface.
- During the self-test.
- When the cutter cover is opened.
- During paper feeding using the FEED button.
- When the printer stops printing due to a paper-end.
- When an error has occurred.

2.1.2.3 Reverse mode (data transmission from printer to host)

The STATUS data transmission from the printer to the host proceeds in the Nibble or Byte mode.

- Description

  This mode allows data transmission from the asynchronous printer under the control of the host.

  Data transmissions in the Nibble Mode are made via the existing control lines in units of four bits (a Nibble). In the Byte Mode, data transmissions proceed by making the eight-bit data lines bidirectional.

  Both modes fail to proceed concurrently in the Compatibility Mode, thereby causing half duplex transmission.

2.1.2.4 Interface pin assignments for each mode

Pin	Source	Compatibility Mode	Nibble Mode	Byte Mode
1	Host	nStrobe	HostClk	HostClk
2	Host/Ptr	Data0 (LSB)	Data0 (LSB)	Data0 (LSB)
3	Host/Ptr	Data1	Data1	Data1
4	Host/Ptr	Data2	Data2	Data2
5	Host/Ptr	Data3	Data3	Data3
6	Host/Ptr	Data4	Data4	Data4
7	Host/Ptr	Data5	Data5	Data5
8	Host/Ptr	Data6	Data6	Data6
9	Host/Ptr	Data7 (MSB)	Data7 (MSB)	Data7 (MSB)
10	Printer	nAck	PtrClk	PtrClk
11	Printer	Busy	PtrBusy/Data3, 7	PtrBusy
12	Printer	PError	AckDataReq/Data2, 6	AckDataReq
13	Printer	Select	Xflag/Data1, 5	Xflag
14	Host	nAutoFd	HostBusy	HostBusy
15		NC	ND	ND
16		GND	GND	GND
17		FG	FG	FG
18	Printer	Logic-H	Logic-H	Logic-H
19		GND	GND	GND
20		GND	GND	GND
21		GND	GND	GND
22		GND	GND	GND
23		GND	GND	GND
24		GND	GND	GND
25		GND	GND	GND
26		GND	GND	GND
27		GND	GND	GND
28		GND	GND	GND
29		GND	GND	GND
30		GND	GND	GND
31	Host	nInit	nInit	nInit
32	Printer	nFault	nDataAvail/Data0, 4	nDataAvail
33		GND	ND	ND
34	Printer	DK_STATUS	ND	ND
35	Printer	+5V	ND	ND
36	Host	nSelectIn	1284-Active	1284-Active

*NC: Not Connected
ND: Not Defined

NOTES:
1. A prefix “n” to signal names refers to “L” active signals. To the host not provided with all the signal lines listed above, bidirectional communication fails.
2. For interfacing, signal lines shall use twisted pair cables with the return sides connected to signal ground level.
3. Interfacing conditions shall be all based on the TTL level to meet the characteristics described below. In addition, both rise time and fall time of each signal shall be 0.5 μs or less.
4. Data transmission shall not ignore the signals nAck or Busy. An attempt to transmit data with either signal, nAck or Busy, ignored can cause lost data. (Data transmissions to the printer shall be made after verifying the nAck signal or while the Busy signal is at the “L” level.)
5. Interface cables shall be the minimum length required.

2.1.2.5 Electrical characteristics

DC Characteristics (Except Logic-H, +5 V signals)

Characteristics	Symbol	Specifications		Conditions
		Min	Max	
Output HIGH voltage	V_{OH}	*2.4 V	5.5 V	*I_{OH}=0.32 mA
Output LOW voltage	V_{OL}	-0.5 V	*0.4 V	*I_{OL}=12 mA
Output HIGH current	I_{OH}	0.32 mA	-	V_{OH}=2.4 V
Output LOW current	I_{OL}	-12 mA	-	V_{OL}=0.4 V
Input HIGH voltage	V_{IH}	2.0 V	-	
Input LOW voltage	V_{IL}	-	0.8 V	
Input HIGH current	I_{IH}	-	-0.32 mA	V_{IH}=2.0 V
Input LOW current	I_{IL}	-	12 mA	V_{IL}=0.8 V

Logic-H Signal Sender Characteristics

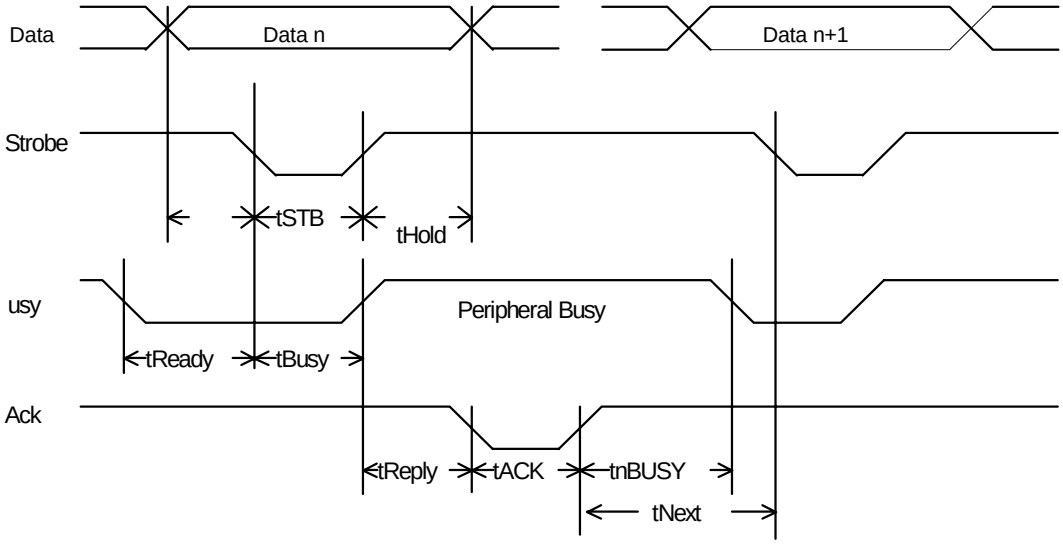
Characteristics	Symbol	Specifications		Conditions
		Min	Max	
Output HIGH voltage	V_{OH}	3.0 V	5.5 V	
Output LOW voltage	V_{OL}	-	2.0 V	While the power is OFF

+5 V Signal Sender Characteristics

Characteristics	Symbol	Specifications		Conditions
		Min	Max	
Output HIGH voltage	V_{OH}	*2.4 V	5.5 V	*I_{OH}=0.32 mA
Output LOW voltage	V_{OL}	-	- **	While the power is OFF
Output HIGH current	I_{OH}	-	0.32 mA	V_{OH}=2.4 V
Output LOW current	I_{OL}	- **	-	While the power is OFF

** No guarantee is offered to V_{OL} and I_{OL} while the power is OFF.

2.1.2.6 Data Receiving Timing (Compatibility Mode)



Characteristics	Symbol	Specifications	
		Min [ns]	Max [ns]
Data Hold Time	tHold	750	--
Data Setup Time	tSetup	750	--
STROBE Pulse Width	tSTB	750	--
READY Cycle Idle Time	tReady	0	--
BUSY Output Delay Time	tBUSY	0	500
Data Processing Time	tReply	0	∞
ACKNLG Pulse Width	tACK	500	10 µs
BUSY Release Time	tnBUSY	0	∞
ACK Cycle Idle Time	tNEXT	0	--

*The printer latches data at the nStrobe ↓ timing

2.1.2.7 Notes on resetting the printer through the interface

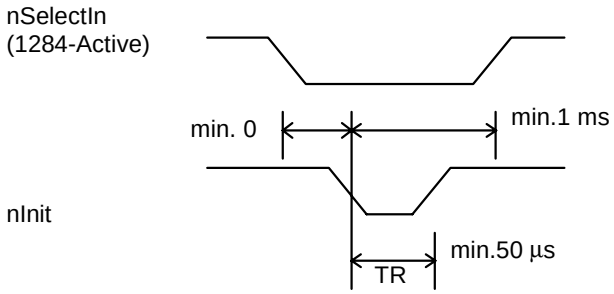
The printer reset is available through the interface nInit signal (pin 31) by changing the DIP switch setting. (Refer to Table 3.3.4, DIP Switch 2.)

Table 2.1.5 DIP Switch Setting for Printer Reset

Signal Line	DIP Switch	Reset Condition
Pin 31 (nInit)	DSW 2-4: ON	TTL-LOW level input

The printer reset through the nInit signal is only available with the SelectIn (1284-Active) signal at LOW. To enable the printer reset, the following signal timing shall be satisfied.

Minimum reset pulse width TR: 50 μs (minimum)



2.1.2.8 Notes on setting DIP switch 1-8 to ON

1) The printer mechanism stops but does not become busy when: an error has occurred, the cutter cover is open, printing stops due to a paper-end, or paper is fed using the paper FEED switch.
2) When setting DIP switch 1-8 to ON to enable handshaking with the printer, be sure to check the printer status using the **GS a** command and the ASB function. In this setting, the default value of *n* for **GS a** is 2. The printer automatically transmits the printer status, depending on online/offline changes.
3) When using the **DLE EOT** and **DLE ENQ** commands, be sure that the receive buffer does not become full.
   - When using a host that cannot transmit data when the printer is busy:
     If an error has occurred, **DLE EOT** and **DLE ENQ** cannot be used when the printer is busy due to a receive buffer-full state.
   - When using a host that can transmit data when the printer is busy:
     When the receive buffer becomes full while transmitting bit-image data, **DLE EOT** or **DLE ENQ** used while sending bit-image data is processed as bit-image data. The data transmitted when the receive buffer is full may be lost.

     Example: Check the printer status using **GS r 1** or **GS r 49** after transmitting each line of data and use the 16 KB receive buffer. Transmit one line of data so that the receive buffer does not become full.

2.1.2.9 Reception of status from the printer through the bidirectional parallel interface

In the bidirectional parallel interface specifications, the printer status transmission is available by using the bidirectional communication facility in the Nibble/Byte Modes in accordance with the IEEE 1284.

In this case, as opposed to the RS-232 serial interface specifications, the real-time interruptions from the printer to the host are disabled, and thus, precautions must be taken to the following.

1) Allowable capacity of the printer internal buffer is 99 bytes (except ASB status). Status signals exceeding this capacity will be discarded. To prevent possible loss of status, the host shall be ready for data acceptance (Reverse Mode).
2) When ASB is used, the host is preferably in the wait state for data acceptance (Reverse Idle Mode). When this state is not available, the host shall enter the Reverse Mode to constantly monitor the presence of data.
3) When ASB is used, preference shall be given to the ASB status for transmission over the other status signals. Any accumulated ASB status signals left for transmission from the last to the newest ASB status transmission shall be transmitted together at one time as one ASB status showing the presence of change, followed by the latest ASB status.

Example: In the normal (wait) state, the ASB status is configured as follows.

First Status	Second Status	Third Status	Fourth Status
0001 0000	0000 0000	0000 0000	0000 0000

When the following sequence of operations proceed and near end is detected, and the FEED button is pressed and released, the following pieces of data are accumulated.

	First Status	Second Status	Third Status	Fourth Status	
①	0001 0000	0000 0000	0000 0011	0000 0000	Near end detection
②	0101 1000	0000 0000	0000 0011	0000 0000	FEED button is pressed
③	0001 0000	0000 0000	0000 0011	0000 0000	FEED button is released

When the ASB status is received following this, a total of eight (8) bytes of ASB will be transmitted as follows.

Accumulated ASB (①+②+③)

	First Status	Second Status	Third Status	Fourth Status
Accumulated ASB(①+②+③)	0101 1000	0000 0000	0000 0011	0000 0000
+	First Status	Second Status	Third Status	Fourth Status
The latest ASB (③)	0001 0000	0000 0000	0000 0011	0000 0000
Fourth Status				

2.1.3 Ethernet Interface

Unless otherwise noted, this section describes only the functional specifications of the Ethernet interface.

2.1.3.1 Specifications

Physical communications standard:	10Base-T (IEEE802.3)
Supported protocol:	TCP/IP
Printing functions:	Printing by standard protocols (lp, lpr, FTP) Socket communications printing (port9100)
Functions to monitor settings:	Status displayed by LEDs Various settings and states displayed by Telnet Various settings and states displayed by Web browser IP address setting by arp + ping Supports rarp Supports BOOTP Supports DHCP Supports ping Status printing function Ethernet interface setting initialization using the Test button Status monitoring by ENPC Status monitoring by SMNP

2.1.3.2 Ethernet test button

Type: Non-locking push button

Quantity: 1

Location: Refer to Figure 2.2.3

Functions:

1) Setting Initialization
   Holding the Ethernet test button down while turning on the printer power, and continuing to hold it down for 5 seconds or more, causes all of the Ethernet interface's internal settings to return to their factory default values.

2) Status Sheet Test Printing
   Holding the test button down for 3 seconds or more while the printer is ready to print causes the Ethernet interface's internal settings to be printed out.

2.1.3.3 Ethernet LEDs

Type: LED

Quantity: One red and one green

Location: Refer to Figure 2.2.3.

Functions: The operating status of the Ethernet interface is indicated by the combined status of the Ethernet LEDs.

No	GREEN	RED	STATUS
1	Off	Off	Power off
2	Off	On	Hardware error
3	Off	1 blink	CPU test error
4	Off	6 blink	Printer reset error
5	On	Off	Waiting
6	Slow blinking	Off	Data or status sheet printing
7	Slow blinking in unison		Download mode
8	Blinking alternately		Downloading
9	Fast blinking in unison		Initializing
10	Fast blinking	Off	Sending and receiving packets

2.1.3.4 Basic communications protocols

Protocol	Application
IP/ARP/ICMP/UDP/TCP	Basic communications protocols for various functions (used by the following higher-level protocols)

2.1.3.5 Printing communications protocols

Protocol	Application
lp/lpr	Transfers printing data
FTP	Transfers printing data interactively
TCP Socket Port	Transfers printing data and printer status by direct socket communications (bidirectional)

1) lp/lpr

Remote printer name:	aux
Kanji filter:	(EUC→JIS)
Maximum simultaneous connections:	10
Number of connections that can print:	1 (other users wait until printing is done)
Time out:	About 5 minutes
Job deletion:	Not supported
Banner printing:	Not supported

2) FTP

Port number:	21
Password:	None
Max. simultaneous connections:	3
Number of connections that can print:	1 (other users wait until printing is done)
Time out:	None
Job deletion:	Not supported
Supported commands:	USER (specified user name) BYE (log off) PUT (specifies and sends file to print) ASCII (specifies ASCII-format transfer) BINARY (specifies binary-format transfer) LS (displays status of the Ethernet interface)

3) Socket communications

Port type:	TCP comm. port for direct printing
Port number:	9100
Port communication direction:	Bidirectional
Time out:	About 5 minutes

2.1.3.6 Status inquiry and setting protocols

Protocol	Application
TELNET	For displaying module status and making settings by Telnet commands
HTTP	For displaying module status and making settings by Web browser
SNMP	For acquiring and setting module settings or printer status by custom or general purpose MIB tool
ENPC	For acquiring and setting module settings or printer status by custom setup utility (WinConfig)

1) TELNET

Port number:	23
User name:	None
Password:	common with HTTP
Maximum simultaneous connections:	1
Time out:	Aborts if not accessed within about 2 minutes
Display language:	English

2) HTTP

Port number:	80
User name:	Optional
Password:	Common with Telnet
Maximum simultaneous connections:	1
HTTP version:	HTTP/1.0
Language support:	An HTML file can be downloaded to the Ethernet interface to support any language.

3) SNMP (MIB)

Terminology:

MIB	Management Information Base
PDU	Protocol Data Unit
SNMP version:	SNMP v1(RFC1157) compliant (SNMP v2 not supported)
Transport protocol:	UDP/IP
Community:	Each item may be up to 31 ASCII characters

Community	Object Attribute	Default
#1	Read-Only	“public”
#2	Read-Write	None
Trap #1	Read-Write	None
Trap #2	Read-Write	None

Trap destination:	Up to two IP addresses settable
MIB support:	Part of MIB-II (RFC1213) Part of Host Resource MIB Part of Print Server MIB
PDU support:	Get Request Get Next Request Set Request Get Response Trap
Server port number:	161
Trap sending port number:	162

4) ENPC

Protocol:	UDP/IP
UDP port number:	3289
Compatible packet types:	Probe Initialize Query Setup Notify

The Ethernet interface does not send Request packets, and Reply packets are ignored.

2.1.3.7 Automatic IP Address Assignment Protocols

The Ethernet interface supports the following protocols for automatic IP address assignment.

The automatic assignment is performed according to the sequence indicated in the following table, and if a protocol is disabled or fails, the next protocol is tried.

When an IP address is acquired, the next protocol is not tried.

If the IP address acquirement by DHCP fails, the IP address cannot be assigned. If this occurs, the printer power must be turned on again or resetting with the utility is necessary.

Protocol	Sequence	Application
RARP	1	Acquiring IP address
BOOTP	2	Acquiring IP address
DHCP	3	Acquiring IP address
Manual setting	4	Using the internal set parameters

1) RARP

Acquirable item:	IP address
No. of RARP requests:	Once

2) IP Address Acquisition by BOOTP

Acquirable item:	IP address
No. of BOOTP requests:	Once

3) IP Address Acquisition by DHCP

Acquirable items:	IP address, subnet mask, gateway address
DHCP Discover retries:	10 times
DHCP Discover retry interval:	30 seconds
DHCP Request retries:	5 times
DHCP Request retry interval:	5 seconds

4) Manual Setting

The Ethernet interface operates in accordance with the internal parameter settings.

2.1.3.8 Internal Communications Parameters

Item List

Item	Parameter	Initial value	Telnet		HTTP		Status printout
			Ref.	Setting	Ref.	Setting	Ref.
IP address		192.168.192.168	○	○	○	○	○
Subnet mask		255.255.255.0	○	○	○	○	○
Gateway address		255.255.255.255	○	○	○	○	○
RARP function	Enable/Disable	Disable	○	○	○	○	○
BOOTP function	Enable/Disable	Disable	○	○	○	○	○
DHCP function	Enable/Disable	Disable	○	○	○	○	○
arp/ping IP setting	Enable/Disable	Enable	○	○	○	○	×
Community name 1 (read-only)	Max. 16 characters	“public”	○	×	○	×	○
Community name 2 (read-write)	Max. 16 characters.	None	○	○	○	○	○
Community name (IP Trap #1)		None	×	×	○	○	×
Community name (IP Trap #2)		None	×	×	○	○	×
IP Trap #1 Address		None	×	×	○	○	×
IP Trap #2 Address		None	×	×	○	○	×
Password		None	×	○	×	○	×
Hardware version			○	×	○	×	○
Firmware version			○	×	○	×	○
MAC address			○	×	○	×	○

1) Internal Parameter Setting Methods

Using an HTTP browser
Using Telnet
Using ENPC protocol
Using arp and ping commands (only to set IP address)

2) Setting with HTTP browser

Settings can be made by an HTTP browser when connected to the module.
The new IP address takes effect when the printer power is turned off and back on.

3) Setting with Telnet

Settings can be made by Telnet when a Telnet client is in a normal communications state with the module.
The new IP address takes effect when the printer power is turned off and back on.

4) EN Setting with ENPC

As the ENPC protocol is used, special application software is required.
EPSON provides a dedicated utility which can be used to make miscellaneous settings employing the ENPC protocol.

5) Setting the IP address with arp + ping

This function is available only when it has been enabled.
The setting can be made only from a host in the same segment as the module.
The host must support both arp and ping commands.
The new IP address takes effect when the module responds to the ping command.

Example-1: using SunOS
arp –s 123.456.789.123 00:00:85:06:00:01 temp
ping 123.456.789.123

Example-2: using Windows
arp –s 123.456.789.123 00-00-85-06-00-01
ping 123.456.789.123

How to check the MAC Address

The MAC address of the UB-E01 can be checked with any of the following methods:

(1) Printing the status sheet
(2) Checking the seal on the PCB
(3) Checking the printer self-test

2.1.3.9 Initializing

A standby period is required before the network functions become operational when the UB-E01 power is turned on or following intialization as a consequence of a reset.

Standby period: Approximately 20 seconds

No network functions will work during this standby period.

2.2 Connectors

2.2.1 Interface connectors

Refer to Section 2.1, Interface Specifications.

1) RS-232 serial interface model

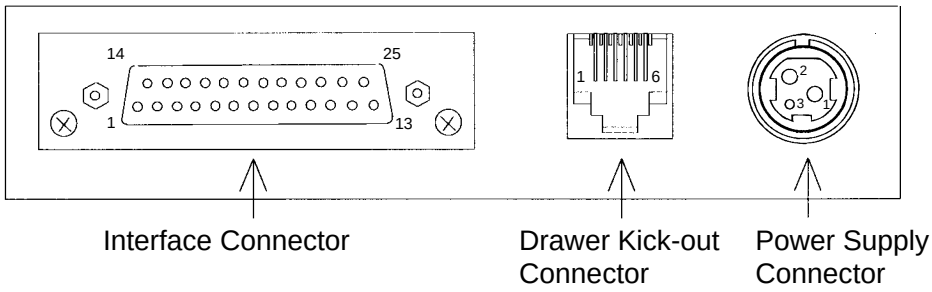


Figure 2.2.1 Serial Connector Panel Diagram

2) IEEE 1284 Parallel interface model

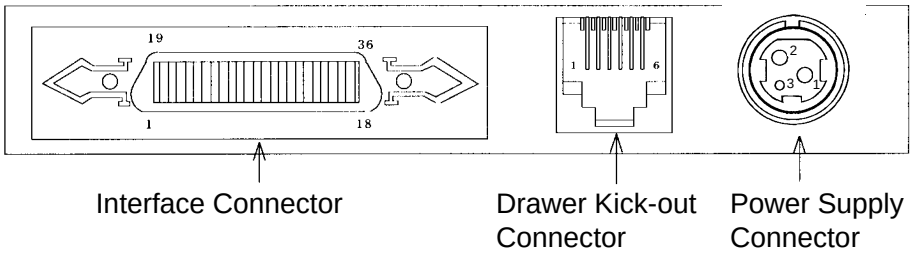


Figure 2.2.2 Parallel Connector Panel Diagram

3) 10Base-T Ethernet interface model

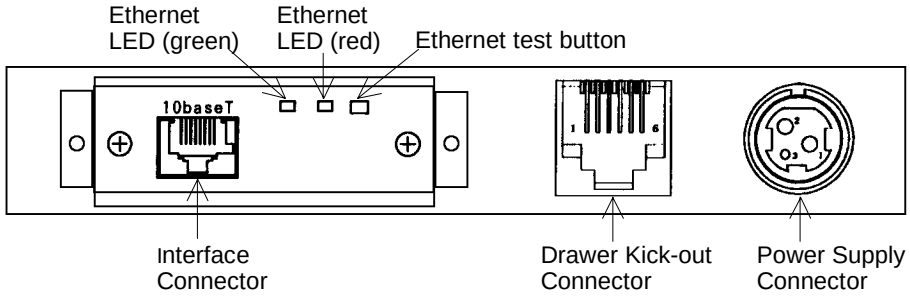


Figure 2.2.3 10Base-T Ethernet Connector Panel Diagram

4) Others

USB interface models are available as a dealer's option.
Refer to the specifications for each interface board.

2.2.2 Power supply connector

This connector is used to connect the printer to an external power source.

1) Pin assignments: Refer to Table 2.2.1.
2) Model (printer side): Hosiden TCS7960-53-2010 (or equivalent)

Table 2.2.1 Power Supply Connector Pin Assignments

Pin Number	Signal Name
1	+ Power source
2	GND
3	NC
Shell	FG

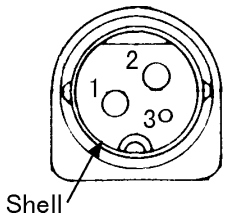


Figure 2.2.4 Power Supply Connector

NOTE: Be sure to ground the frame ground (FG) screw on the board at the bottom of the unit.

2.2.3 Drawer kick-out connector (modular connector)

The signal specified by the **ESC p** command is output to this connector. The host can confirm the input signal state by using the **DLE EOT**, **GS a**, and **GS r** commands.

1) Pin assignments

Table 2.2.2 Drawer Kick-out Connector Pin Assignments

Pin No.	Signal Name	Direction
1	Frame GND	--
2	Drawer kick-out drive signal 1	Output
3	Drawer open/close signal	Input
4	+24 V	--
5	Drawer kick-out drive signal 2	Output
6	Signal GND	--

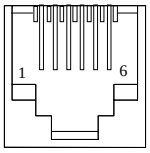


Figure 2.2.5 Drawer Kick-out Connector

2) Drawer kick-out drive signal

Output signal: Voltage: Approximately 24 V
Current: 1 A or less

CAUTION: To avoid an overcurrent, the resistance of the drawer kick-out solenoid must be 24Ω or more.

Output waveform: Outputs the waveforms in Figure 2.2.6 to points A and B in Figure 2.2.7.
(The ESC p command specifies ON time t1 and OFF time t2.)

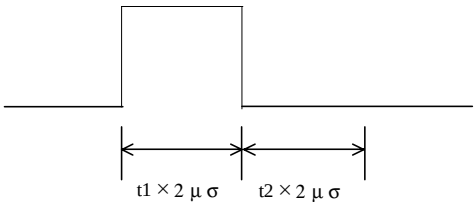


Figure 2.2.6 Drawer Kick-out Drive Signal

NOTE: ON time cannot be set less than 100 ms.

3) Drawer open/close signal

Input signal level (connector pin 3): "L" = 0 V , "H" = 2 to 5 V

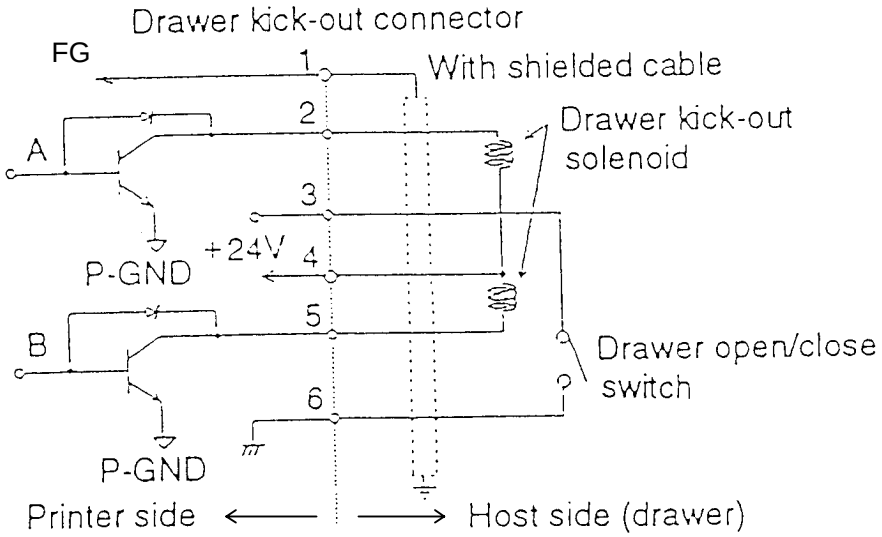


Figure 2.2.7 Drawer Circuitry

NOTES: 1. Two driver transistors cannot be driven simultaneously.

2. The drawer drive duty must be as shown below:

$$\frac{\text{On time}}{\text{(ON time + OFF time)}} \leq 0.2$$

3. Be sure to use the printer power supply (connector pin 4) for the drawer power source.
4. The resistance of the drawer kick-out solenoid must not be less than that specified (24 Ω). Otherwise, an overcurrent could damage the solenoid.

3. FUNCTIONS

3.1 Commands

3.1.1 List of commands for all printer models

Command	Name	Command Classification (*1)	
		Execution Command	Setting Command
HT	Horizontal tab	○	
LF	Print and line feed	○	
CR	Print and carriage return	○	
DLE EOT	Real-time status transmission	○	
DLE ENQ	Real-time request to printer	○	
ESC SP	Set right-side character spacing		○
ESC !	Select print mode(s)		○
ESC %	Select/cancel downloaded character set		○
ESC &	Define user-defined characters		○
ESC (A	Control beeper tones	○	○
ESC ∗	Select bit-image mode	○	
ESC –	Turn underline mode on/off		○
ESC 2	Select default line spacing		○
ESC 3	Set line spacing		○
ESC <	Return home	○	
ESC =	Select peripheral device		○
ESC ?	Cancel user-defined character		○
ESC @	Initialize printer	○	○
ESC D	Set horizontal tab positions		○
ESC E	Turn emphasized mode on/off		○
ESC G	Turn double-strike mode on/off		○
ESC J	Feed paper and printing	○	
ESC K	Print and reverse feed	○	
ESC R	Select an international character set		○
ESC U	Turn unidirectional printing mode on/off		○
ESC a	Select justification		○
ESC c 3	Select paper sensor to output paper-end signal (only for parallel interface model)		○
ESC c 4	Select paper sensor(s) to stop printing		○
ESC c 5	Enable/disable panel buttons		○
ESC d	Printing and feed *n* lines	○	
ESC e	Print and reverse feed *n* lines	○	
ESC p	Generate pulse	○	
ESC r	Select print color (only for 2-color print model)		○

Command	Name	Command Classification (*1)	
		Execution Command	Setting Command
ESC t	Select character code table		O
ESC {	Turn upside-down printing mode on/off		O
GS (A	Execute test print	O	
GS I	Transmit printer ID	O	
GS V	Feed paper for cutting position	O	
GS a	Enable/disable Automatic Status Back	O	O
GS r	Transmit status	O	
GS z 0	Set online recovery wait time		O

*1: There are two major classifications for comand, as follows:

Execution command: Executes printer functions. Does not affect the following data.

Setting command: Sets the printer's operational conditions. The printer status is retained by flag, and the command affects the following data.

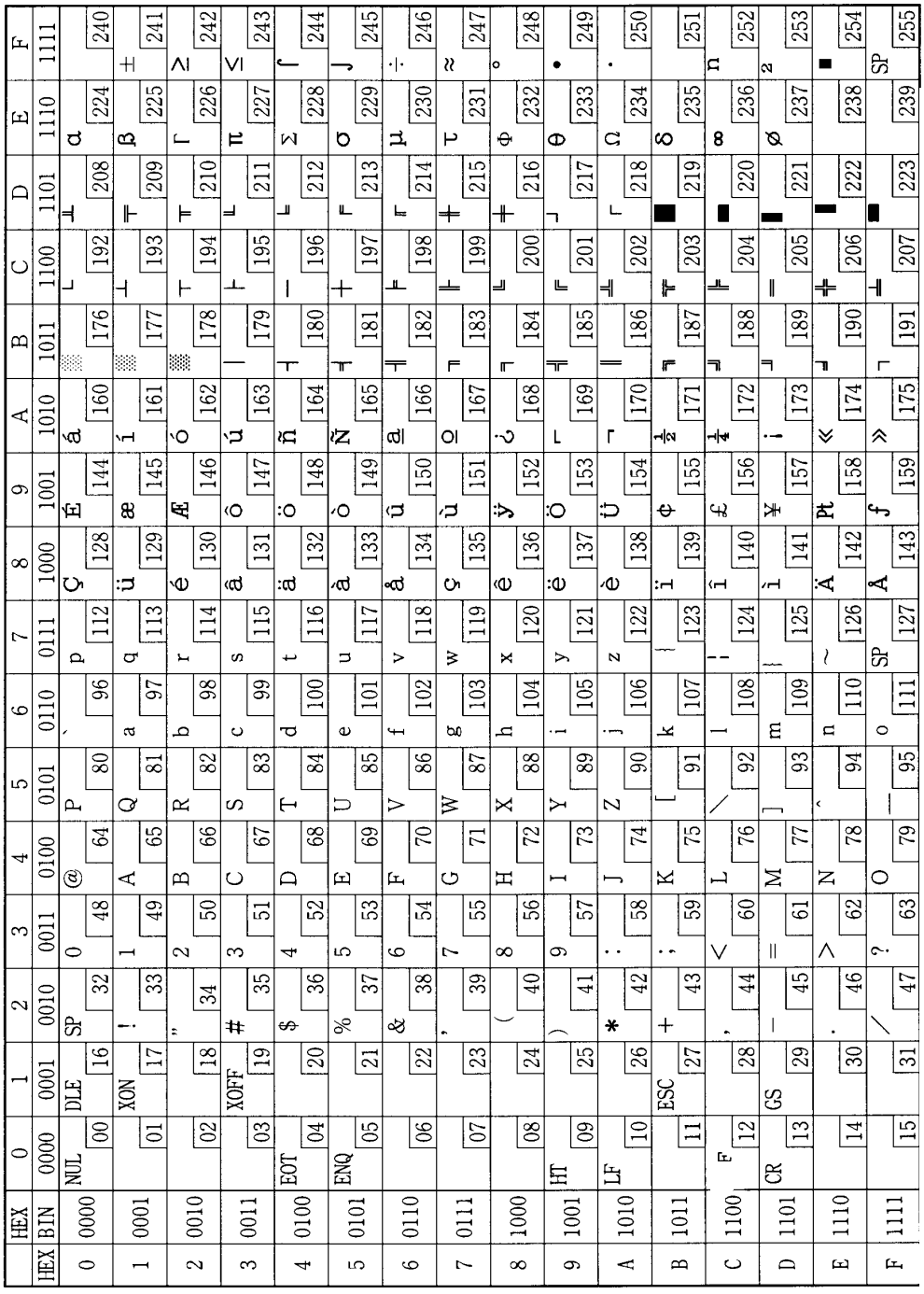
O marks in the table above show whether the command is an execution or setting command.

3.1.2 List of Kanji commands for the Japanese, Chinese, Taiwanese, and Korean models

Command	Name	Command Classification (*1)	
		Execution Command	Setting Command
FS !	Set print mode(s) for Kanji characters		O
FS &	Select Kanji character mode		O
FS –	Turn underline mode on/off for Kanji characters		O
FS .	Cancel Kanji character mode		O
FS 2	Define user-defined Kanji characters		O
FS ?	Cancel user-defined Kanji characters		O
FS C	Select Kanji character code system		O
FS S	Set left-and right-side Kanji character spacing		O
FS W	Turn quadruple-size mode on/off for Kanji characters		O

3.2 Character Code Tables

3.2.1 Page 0 (PC437: U.S.A. Standard Europe) (International character set: U.S.A.)



HEX BIN	0 0000	1 0001	2 0010	3 0011	4 0100	5 0101	6 0110	7 0111	8 1000	9 1001	A 1010	B 1011	C 1100	D 1101	E 1110	F 1111
0 0000	NUL 00	DLE 16	SP 32	0 48	@ 64	P 80	` 96	p 112	Ç 128	É 144	á 160	▒ 176	└ 192	┴ 208	α 224	240
1 0001	01	XON 17	! 33	1 49	A 65	Q 81	a 97	q 113	ü 129	æ 145	í 161	▒ 177	┴ 193	┬ 209	ß 225	± 241
2 0010	02	18	" 34	2 50	B 66	R 82	b 98	r 114	é 130	Æ 146	ó 162	▒ 178	┬ 194	├ 210	Γ 226	≥ 242
3 0011	03	XOFF 19	# 35	3 51	C 67	S 83	c 99	s 115	â 131	ô 147	ú 163	│ 179	├ 195	─ 211	π 227	≤ 243
4 0100	EOT 04	20	$ 36	4 52	D 68	T 84	d 100	t 116	ä 132	ö 148	ñ 164	┤ 180	─ 196	└ 212	Σ 228	⌠ 244
5 0101	ENQ 05	21	% 37	5 53	E 69	U 85	e 101	u 117	à 133	ò 149	Ñ 165	╡ 181	┼ 197	┌ 213	σ 229	⌡ 245
6 0110	06	22	& 38	6 54	F 70	V 86	f 102	v 118	å 134	û 150	ª 166	╢ 182	╞ 198	╓ 214	µ 230	÷ 246
7 0111	07	23	' 39	7 55	G 71	W 87	g 103	w 119	ç 135	ù 151	º 167	╖ 183	╟ 199	╫ 215	τ 231	≈ 247
8 1000	08	24	(40	8 56	H 72	X 88	h 104	x 120	ê 136	ÿ 152	¿ 168	╕ 184	╚ 200	╪ 216	Φ 232	° 248
9 1001	HT 09	25	) 41	9 57	I 73	Y 89	i 105	y 121	ë 137	Ö 153	⌐ 169	╣ 185	╔ 201	┘ 217	Θ 233	• 249
A 1010	LF 10	26	* 42	: 58	J 74	Z 90	j 106	z 122	è 138	Ü 154	¬ 170	║ 186	╩ 202	┌ 218	Ω 234	· 250
B 1011	ESC 11	27	+ 43	; 59	K 75	[91	k 107	{ 123	ï 139	¢ 155	½ 171	╗ 187	╦ 203	▀ 219	δ 235	251
C 1100	FF 12	28	, 44	< 60	L 76	\ 92	l 108	¦ 124	î 140	£ 156	¼ 172	╝ 188	╠ 204	▄ 220	∞ 236	n 252
D 1101	CR 13	GS 29	- 45	= 61	M 77	] 93	m 109	} 125	ì 141	¥ 157	¡ 173	╜ 189	═ 205	▌ 221	ø 237	2 253
E 1110	14	30	. 46	> 62	N 78	^ 94	n 110	~ 126	Ä 142	₧ 158	« 174	╛ 190	╬ 206	▐ 222	ε 238	■ 254
F 1111	15	31	/ 47	? 63	O 79	_ 95	o 111	SP 127	Å 143	ƒ 159	» 175	┐ 191	╧ 207	▀ 223	∩ 239	SP 255

NOTE: The actual print patterns differ from those in the above charactor code.

3.2.2 Page 1 (Katakana)

	HEX	8	9	A	B	C	D	E	F
HEX	BIN	1000	1001	1010	1011	1100	1101	1110	1111
0	0000	128	144	SP 160	176	192	208	224	240
1	0001	129	145	161	177	193	209	225	241
2	0010	130	146	162	178	194	210	226	242
3	0011	131	147	163	179	195	211	227	243
4	0100	132	148	164	180	196	212	228	244
5	0101	133	149	165	181	197	213	229	245
6	0110	134	150	166	182	198	214	230	246
7	0111	135	151	167	183	199	215	231	247
8	1000	136	152	168	184	200	216	232	248
9	1001	137	153	169	185	201	217	233	249
A	1010	138	154	170	186	202	218	234	250
B	1011	139	155	171	187	203	219	235	251
C	1100	140	156	172	188	204	220	236	252
D	1101	141	157	173	189	205	221	237	253
E	1110	142	158	174	190	206	222	238	254
F	1111	143	159	175	191	207	223	239	SP 255

3.2.3 Page 2 (PC850: Multilingual)

	HEX	8	9	A	B	C	D	E	F
HEX	BIN	1000	1001	1010	1011	1100	1101	1110	1111
0	0000	Ç 128	É 144	á 160	▒ 176	└ 192	ð 208	Ó 224	— 240
1	0001	ü 129	æ 145	í 161	▒ 177	┴ 193	Ð 209	ß 225	± 241
2	0010	é 130	Æ 146	ó 162	▒ 178	┬ 194	Ê 210	Ô 226	‗ 242
3	0011	â 131	ô 147	ú 163	│ 179	├ 195	Ë 211	Ò 227	¾ 243
4	0100	ä 132	ö 148	ñ 164	┤ 180	─ 196	È 212	õ 228	¶ 244
5	0101	à 133	ò 149	Ñ 165	Á 181	┼ 197	ı 213	Õ 229	§ 245
6	0110	å 134	û 150	ª 166	Â 182	ã 198	Í 214	µ 230	÷ 246
7	0111	ç 135	ù 151	º 167	À 183	Ã 199	Î 215	þ 231	¸ 247
8	1000	ê 136	ÿ 152	¿ 168	© 184	╚ 200	Ï 216	Þ 232	° 248
9	1001	ë 137	Ö 153	® 169	╣ 185	╔ 201	┘ 217	Ú 233	¨ 249
A	1010	è 138	Ü 154	¬ 170	║ 186	╩ 202	┌ 218	Û 234	· 250
B	1011	ï 139	ø 155	½ 171	╗ 187	╦ 203	■ 219	Ù 235	¹ 251
C	1100	î 140	£ 156	¼ 172	╝ 188	╠ 204	▬ 220	ý 236	³ 252
D	1101	ì 141	Ø 157	¡ 173	¢ 189	═ 205	¦ 221	Ý 237	² 253
E	1110	Ä 142	× 158	« 174	¥ 190	╬ 206	Ì 222	¯ 238	■ 254
F	1111	Å 143	ƒ 159	» 175	┐ 191	¤ 207	▀ 223	´ 239	SP 255

3.2.4 Page 3 (PC860: Portuguese)

	HEX	8	9	A	B	C	D	E	F
HEX	BIN	1000	1001	1010	1011	1100	1101	1110	1111
0	0000	Ç 128	É 144	á 160	▒ 176	└ 192	╨ 208	α 224	≡ 240
1	0001	ü 129	À 145	í 161	▒ 177	┴ 193	╤ 209	ß 225	± 241
2	0010	é 130	È 146	ó 162	▒ 178	┬ 194	╥ 210	Γ 226	≥ 242
3	0011	â 131	ô 147	ú 163	│ 179	├ 195	╙ 211	π 227	≤ 243
4	0100	ã 132	õ 148	ñ 164	┤ 180	─ 196	╘ 212	Σ 228	⌠ 244
5	0101	à 133	ò 149	Ñ 165	╡ 181	┼ 197	╒ 213	σ 229	⌡ 245
6	0110	Á 134	Ú 150	ª 166	╢ 182	╞ 198	╓ 214	µ 230	÷ 246
7	0111	ç 135	ù 151	º 167	╖ 183	╟ 199	╫ 215	τ 231	≈ 247
8	1000	ê 136	Ì 152	¿ 168	╕ 184	╚ 200	╪ 216	Φ 232	° 248
9	1001	Ê 137	Õ 153	⌐ 169	╣ 185	╔ 201	┘ 217	Θ 233	• 249
A	1010	è 138	Ü 154	¬ 170	║ 186	╩ 202	┌ 218	Ω 234	· 250
B	1011	Í 139	¢ 155	½ 171	╗ 187	╤ 203	■ 219	δ 235	√ 251
C	1100	Ô 140	£ 156	¼ 172	╝ 188	╠ 204	▄ 220	∞ 236	n 252
D	1101	ì 141	Ù 157	¡ 173	╜ 189	═ 205	▌ 221	ø 237	² 253
E	1110	Ã 142	₧ 158	« 174	╛ 190	╬ 206	▐ 222	∈ 238	■ 254
F	1111	Â 143	ƒ 159	» 175	┐ 191	╧ 207	▀ 223	∩ 239	SP 255

3.2.5 Page 4 (PC863: Canadian-French)

	HEX	8	9	A	B	C	D	E	F
HEX	BIN	1000	1001	1010	1011	1100	1101	1110	1111
0	0000	Ç 128	É 144	¦ 160	▒ 176	└ 192	╨ 208	α 224	≡ 240
1	0001	ü 129	È 145	´ 161	▒ 177	┴ 193	╤ 209	ß 225	± 241
2	0010	é 130	Ê 146	ó 162	▒ 178	┬ 194	╥ 210	Γ 226	≥ 242
3	0011	â 131	ô 147	ú 163	│ 179	├ 195	╙ 211	π 227	≤ 243
4	0100	Â 132	Ë 148	¨ 164	┤ 180	─ 196	╘ 212	Σ 228	⌠ 244
5	0101	à 133	Ï 149	¸ 165	╡ 181	┼ 197	╒ 213	σ 229	⌡ 245
6	0110	¶ 134	û 150	ª 166	╢ 182	╞ 198	╓ 214	µ 230	÷ 246
7	0111	ç 135	ù 151	¯ 167	╖ 183	╟ 199	╫ 215	τ 231	≈ 247
8	1000	ê 136	¤ 152	Î 168	╕ 184	╚ 200	╪ 216	Φ 232	° 248
9	1001	ë 137	Ô 153	⌐ 169	╣ 185	╔ 201	┘ 217	Θ 233	• 249
A	1010	è 138	Ü 154	¬ 170	║ 186	╩ 202	┌ 218	Ω 234	· 250
B	1011	ï 139	¢ 155	½ 171	╗ 187	╦ 203	■ 219	δ 235	√ 251
C	1100	î 140	£ 156	¼ 172	╝ 188	╠ 204	▄ 220	∞ 236	n 252
D	1101	ì 141	Ù 157	¾ 173	╜ 189	═ 205	▌ 221	ø 237	² 253
E	1110	Ä 142	Û 158	« 174	╛ 190	╬ 206	▐ 222	∈ 238	■ 254
F	1111	§ 143	ƒ 159	» 175	┐ 191	╧ 207	▀ 223	∩ 239	SP 255

3.2.6 Page 5 (PC865: Nordic)

	HEX	8	9	A	B	C	D	E	F
HEX	BIN	1000	1001	1010	1011	1100	1101	1110	1111
0	0000	Ç 128	É 144	á 160	▒ 176	└ 192	╨ 208	α 224	≡ 240
1	0001	ü 129	æ 145	í 161	▒ 177	┴ 193	╤ 209	ß 225	± 241
2	0010	é 130	Æ 146	ó 162	▒ 178	┬ 194	╥ 210	Γ 226	≥ 242
3	0011	â 131	ô 147	ú 163	│ 179	├ 195	╙ 211	π 227	≤ 243
4	0100	ä 132	ö 148	ñ 164	┤ 180	─ 196	╘ 212	Σ 228	⌠ 244
5	0101	à 133	ò 149	Ñ 165	╡ 181	┼ 197	╒ 213	σ 229	⌡ 245
6	0110	å 134	û 150	ª 166	╢ 182	╞ 198	╓ 214	µ 230	÷ 246
7	0111	ç 135	ù 151	º 167	╖ 183	╟ 199	╫ 215	τ 231	≈ 247
8	1000	ê 136	ÿ 152	¿ 168	╕ 184	╚ 200	╪ 216	Φ 232	° 248
9	1001	ë 137	Ö 153	⌐ 169	╣ 185	╔ 201	┘ 217	Θ 233	• 249
A	1010	è 138	Ü 154	¬ 170	║ 186	╩ 202	┌ 218	Ω 234	· 250
B	1011	ï 139	ø 155	½ 171	╗ 187	╦ 203	■ 219	δ 235	√ 251
C	1100	î 140	£ 156	¼ 172	╝ 188	╠ 204	▄ 220	∞ 236	n 252
D	1101	ì 141	Ø 157	¡ 173	╜ 189	═ 205	▌ 221	ø 237	² 253
E	1110	Ä 142	₧ 158	« 174	╛ 190	╬ 206	▐ 222	∈ 238	■ 254
F	1111	Å 143	ƒ 159	¤ 175	┐ 191	╧ 207	▀ 223	∩ 239	SP 255

3.2.7 Page 6 (Hiragana) (Available on the Kanji model)

	HEX	8	9	A	B	C	D	E	F
HEX	BIN	1000	1001	1010	1011	1100	1101	1110	1111
0	0000	礎 128	本 144	SP 160	ー 176	た 192	み 208	過 224	換 240
1	0001	129	145	。 161	あ 177	ち 193	む 209	225	241
2	0010	除 130	荷 146	「 162	い 178	つ 194	め 210	足 226	攻 242
3	0011	131	147	」 163	う 179	て 195	も 211	227	243
4	0100	定 132	特 148	、 164	え 180	と 196	や 212	利 228	産 244
5	0101	133	149	・ 165	お 181	な 197	ゆ 213	229	245
6	0110	信 134	越 150	を 166	か 182	に 198	よ 214	用 230	打 246
7	0111	135	151	ぁ 167	き 183	ぬ 199	ら 215	231	247
8	1000	緑 136	他 152	ぃ 168	く 184	ね 200	り 216	移 232	納 248
9	1001	137	153	ぅ 169	け 185	の 201	る 217	233	249
A	1010	科 138	社 154	ぇ 170	こ 186	は 202	れ 218	下 234	変 250
B	1011	139	155	ぉ 171	さ 187	ひ 203	ろ 219	235	251
C	1100	目 140	瓶 156	ゃ 172	し 188	ふ 204	わ 220	加 236	誂 252
D	1101	141	157	ゅ 173	す 189	へ 205	ん 221	237	253
E	1110	々 142	奉 158	ょ 174	せ 190	ほ 206	゛ 222	解 238	件 254
F	1111	143	159	っ 175	そ 191	ま 207	゜ 223	239	255

3.2.8 Page 7 (One-pass printing Kanji characters) (Available on the Kanji model)

	HEX	8	9	A	B	C	D	E	F
HEX	BIN	1000	1001	1010	1011	1100	1101	1110	1111
0	0000	日 128	会 144	水 160	受 176	点 192	課 208	買 224	非 240
1	0001	129	145	161	177	193	209	225	241
2	0010	扱 130	客 146	木 162	前 178	中 194	証 210	号 226	承 242
3	0011	131	147	163	179	195	211	227	243
4	0100	外 132	券 148	土 164	残 180	内 196	組 212	有 228	送 244
5	0101	133	149	165	181	197	213	229	245
6	0110	額 134	回 150	振 166	止 182	部 198	店 214	期 230	― 246
7	0111	135	151	167	183	199	215	231	247
8	1000	割 136	在 152	数 168	純 184	別 200	認 216	限 232	棄 248
9	1001	137	153	169	185	201	217	233	249
A	1010	検 138	算 154	精 170	替 186	戻 202	廃 218	頭 234	累 250
B	1011	139	155	171	187	203	219	235	251
C	1100	高 140	上 156	銭 172	代 188	門 204	両 220	差 236	違 252
D	1101	141	157	173	189	205	221	237	253
E	1110	価 142	火 158	総 174	値 190	料 206	効 222	括 238	番 254
F	1111	143	159	175	191	207	223	239	255

3.2.9 Page 8 (One-pass printing Kanji characters) (Available on the Kanji model)

	HEX	8	9	A	B	C	D	E	F
HEX	BIN	1000	1001	1010	1011	1100	1101	1110	1111
0	0000	訂 128	計 144	払 160	売 176	名 192	次 208	万 224	室 240
1	0001	129	145	161	177	193	209	225	241
2	0010	正 130	小 146	掛 162	取 178	個 194	不 210	責 226	商 242
3	0011	131	147	163	179	195	211	227	243
4	0100	品 132	金 148	入 164	係 180	領 196	枚 212	終 228	人 244
5	0101	133	149	165	181	197	213	229	245
6	0110	円 134	現 150	貸 166	未 182	収 198	誤 214	了 230	大 246
7	0111	135	151	167	183	199	215	231	247
8	1000	種 136	釣 152	出 168	消 184	予 200	休 216	免 232	安 248
9	1001	137	153	169	185	201	217	233	249
A	1010	担 138	預 154	支 170	費 186	約 202	契 218	伝 234	仕 250
B	1011	139	155	171	187	203	219	235	251
C	1100	当 140	税 156	単 172	年 188	込 204	開 220	自 236	控 252
D	1101	141	157	173	189	205	221	237	253
E	1110	合 142	引 158	返 174	月 190	明 206	閉 222	設 238	基 254
F	1111	143	159	175	191	207	223	239	255

3.2.10 Page 19 (PC858:Euro)

	HEX	8	9	A	B	C	D	E	F
HEX	BIN	1000	1001	1010	1011	1100	1101	1110	1111
0	0000	Ç 128	É 144	á 160	▒ 176	└ 192	ð 208	Ó 224	— 240
1	0001	ü 129	æ 145	í 161	▒ 177	┴ 193	Ð 209	ß 225	± 241
2	0010	é 130	Æ 146	ó 162	▒ 178	┬ 194	Ê 210	Ô 226	‗ 242
3	0011	â 131	ô 147	ú 163	│ 179	├ 195	Ë 211	Ò 227	¾ 243
4	0100	ä 132	ö 148	ñ 164	┤ 180	─ 196	È 212	õ 228	¶ 244
5	0101	à 133	ò 149	Ñ 165	Á 181	┼ 197	€ 213	Õ 229	§ 245
6	0110	å 134	û 150	ª 166	Â 182	ã 198	Í 214	µ 230	÷ 246
7	0111	ç 135	ù 151	º 167	À 183	Ã 199	Î 215	þ 231	¸ 247
8	1000	ê 136	ÿ 152	¿ 168	© 184	╚ 200	Ï 216	Þ 232	° 248
9	1001	ë 137	Ö 153	® 169	╣ 185	╔ 201	┘ 217	Ú 233	¨ 249
A	1010	è 138	Ü 154	¬ 170	║ 186	╩ 202	┌ 218	Û 234	· 250
B	1011	ï 139	ø 155	½ 171	╗ 187	╦ 203	■ 219	Ù 235	¹ 251
C	1100	î 140	£ 156	¼ 172	╝ 188	╠ 204	▬ 220	ý 236	³ 252
D	1101	ì 141	Ø 157	¡ 173	¢ 189	═ 205	¦ 221	Ý 237	² 253
E	1110	Ä 142	× 158	« 174	¥ 190	╬ 206	Ì 222	¯ 238	▪ 254
F	1111	Å 143	ƒ 159	» 175	┐ 191	¤ 207	▬ 223	´ 239	SP 255

3.2.11 Page 20 (Thai Character Code 42)

	8	9	A	B	C	D	E	F
0	ร	๐		ฬ	ย	เ	๎	๒
1	ๅ	๑	ก	อ	ร	แ	๏	๒+
2	ๆ	๒	ข	ด	ฤ	โ	๐	๒
3	็	๓	ค	ต	ล	ใ	๑	๒-
4	่	๔	ฅ	ถ	ว	ไ	๒	๒๏
5	้	๕	ง	ท	ศ	ๆ	๓	๒๒
6	๊	๖	จ	ธ	ษ	๚	๓-	๒+
7	๋	๗	ฉ	น	ส	๛	๓๏	๒-
8	์	๘	ช	บ	ห	๜	๓๐	๒๏
9	ํ	๙	ซ	ป	ฬ	๝	๓+	๒๒
A	๎	ฺ	ฌ	ผ	อ	๞	๔-	๒+
B	๏	ค	ญ	ฝ	ฮ	๟	๔๏	๒-
C	←	๘	ฎ	พ	๔	๠	๔๒	๒๏
D	↑	๑	ฏ	ฟ	ฦ	๔	๔+	๒๒
E	→	๙	ฐ	ภ	า	๐	๒-	๒+
F	↓	ๆ	ฑ	ม	ำ	๘	๒๏	

3.2.12 Page 21 (Thai Character Code 11)

	8	9	A	B	C	D	E	F
0	◌ั	◌็	เ	ฐ	ภ	ะ	๐	๐
1	◌ั◌	◌็◌	ก	ฑ	ม	◌ั	๑	๑
2	◌ิ◌	◌็◌	ข	ฒ	ย	า	๒	๒
3	◌ิ	◌็	ฃ	ณ	ร	ำ	๓	๓
4	◌ี◌	◌็◌	ค	ด	ฤ	◌	๔	๔
5	◌ี	◌่	ฅ	ต	ล	◌	๕	๕
6	◌ึ◌	◌่◌	ฆ	ถ	ฦ	◌	๖	๖
7	◌ึ	◌่	ง	ท	ว	◌	๗	๗
8	◌ื◌	◌่◌	จ	ธ	ศ	◌	๘	๘
9	◌ื	◌้	ฉ	น	ษ	◌	๙	๙
A	◌ุ◌	◌้◌	ช	บ	ส	◌	๚	๚
B	◌ุ	◌้	ซ	ป	ห	฿	◌	๛
C	◌ู◌	◌้◌	ฌ	ผ	ฬ	◌	◌	◌
D	◌ู	◌๊	ญ	ฝ	อ	◌	◌	๑
E	◌ู◌	◌๊◌	ฎ	พ	ฮ	◌	◌	๑
F	◌ู	◌๊	ฏ	ฟ	ฯ	◌	๏	

3.2.13 Page 22 (Thai Character Code 13)

	8	9	A	B	C	D	E	F
0		◌ั		ฐ	ภ	๐	เ	๐
1	◌ั	◌ั	ก	ฑ	ม	๑	แ	๑
2	◌ั	◌ั	ข	ฒ	ย	๒	โ	๒
3	◌ั	◌ั	ฃ	ณ	ร	๓	ใ	๓
4	◌ั		ค	ด	ฤ	๔	ไ	๔
5		◌ั	ฅ	ต	ล	๕	ๅ	๕
6	◌ั	◌ั	ฆ	ถ	ฦ	๖	ๆ	๖
7	◌ั	◌ั	ง	ท	ว	๗	๗	๗
8	◌ั	◌ั	จ	ธ	ศ	◌ั	◌ั	๘
9	◌ั		ฉ	น	ษ	◌ั	◌ั	๙
A		◌ั	ช	บ	ส	◌ั	◌ั	ฯ
B	◌ั	◌ั	ซ	ป	ห	๙	◌ั	๙
C	◌ั	◌ั	ฌ	ผ	ฬ	๑	◌ั	←
D	◌ั	◌ั	ญ	ฝ	อ	๙	๐	↑
E	◌ั		ฎ	พ	ฮ	เ	◌ั	→
F	◌ั		ฏ	ฟ	ฯ	฿	๐	↓

3.2.14 Page 23 (Thai Character Code 14)

	8	9	A	B	C	D	E	F
0	ร	◌ฺ		ฯ	ภ	๐	เ	๐
1	ฯ	◌ั	ก	ั	ม	◌๑	แ	๑
2	ล	◌ิ	ข	า	ย	๒	โ	๒
3	ฯ	◌ี	ฃ	ำ	ร	๓	ใ	๓
4	|	◌ึ	ค	ด	ฤ	◌๔	ไ	๔
5	–	◌ื	ฅ	ต	ล	◌๕	ๅ	๕
6	⊦	◌ุ	ฆ	ถ	ฦ	◌๖	ๆ	๖
7	⊣	◌ู	ง	ท	ว	◌๗	๗	๗
8	⊥	◌ฺ	จ	ธ	ศ	◌๘	็	๘
9	⊤	◌๋	ฉ	น	ษ	◌๙	◌็	๙
A	┼	◌์	ช	บ	ส	◌๊	◌๊	๚
B	▮	◌ๅ	ซ	ป	ห	◌ๅ	◌๋	◌ๅ
C	◌	◌ๆ	ฌ	ผ	ฬ	◌ๆ	◌์	◌ๆ
D	◌๎	◌ุ	ญ	ฝ	อ	◌ุ	◌ุ	◌ุ
E	◌ุ	◌๋	ฎ	พ	ฮ	◌๋	◌ั	◌๋
F	◌๋	◌ๅ	ฏ	ฟ	ฯ	฿	๏	๎

3.2.15 Page 24 (Thai Character Code 16)

	8	9	A	B	C	D	E	F
0	ร	โ		ฐ	ภ	ะ	เ	๐
1	ฯ	ใ	ก	ฑ	ม	ั	แ	๑
2	ล	ๅ	ข	ฒ	ย	า	็	๒
3	ฦ	ๆ	ฃ	ณ	ร	ำ	่	๓
4	ว	็	ค	ด	ฤ	ิ	้	๔
5	ศ	่	ฅ	ต	ล	ี	๊	๕
6	ษ	้	ฆ	ถ	ฦ	ึ	๋	๖
7	ส	๊	ง	ท	ว	ื	์	๗
8	ห	๋	จ	ธ	ศ	ุ	๎	๘
9	ฬ	์	ฉ	น	ษ	ู	๏	๙
A	อ	๎	ช	บ	ส	ฺ	๐	๚
B	ฮ	๏	ซ	ป	ห	๑	+	๛
C	ฯ	๑	ฌ	ผ	ฬ	๒	ๅ	๜
D	ะ	๒	ญ	ฝ	อ	๓	ฮ	๝
E	ั	๓	ฎ	พ	ฮ	๔	ไ	๞
F	า	๔	ฏ	ฟ	ฯ	฿	๘	

3.2.16 Page 25 (Thai Character Code 17)

	8	9	A	B	C	D	E	F
0	◌ั	◌ั		ฉ	ภ	๐	เ	๐
1	◌ั	◌ั	ก	ช	ม	๑	แ	๑
2	◌ิ	◌ิ	ข	ซ	ย	๒	โ	๒
3	◌ิ	◌ิ	ฃ	ฌ	ร	๓	ใ	๓
4	◌ี	◌ี	ค	ญ	ฤ	๔	ไ	๔
5	◌ี	◌ี	ฅ	ฎ	ล	๕	ๅ	๕
6	◌ึ	◌ึ	ฆ	ฏ	ฦ	๖	ๆ	๖
7	◌ึ	◌ึ	ง	ฐ	ว	๗	๗	๗
8	◌ี	◌ี	จ	ฑ	ศ	๘	๘	๘
9	◌ี	◌ี	ฉ	ฒ	ษ	๙	๙	๙
A	◌ึ	◌ึ	ช	ณ	ส	๚	๚	๚
B	◌ึ	◌ึ	ซ	ด	ห	๛	๛	๛
C	◌ี	◌ี	ฌ	ต	ฬ	๑	๑	←
D	◌ี	◌ี	ญ	ถ	อ	๕	๐	↑
E	◌ึ	◌ึ	ฎ	ท	ฮ	เ	๑	→
F	◌ึ	◌ึ	ฏ	ธ	ฯ	฿	๑	↓

3.2.17 Page 26 (Thai Character Code 18)

	8	9	A	B	C	D	E	F
0	┌	◌๘		ฐ	ภ	ๆ	เ	๐
1	┐	◌๑	ก	ฑ	ม	◌๎	แ	๑
2	└	◌๋	ข	ฒ	ย	า	โ	๒
3	┘	◌๊	ฃ	ณ	ร	ำ	ใ	๓
4	├	◌้	ค	ด	ฤ	◌ั	ไ	๔
5	─	◌๏	ฅ	ต	ล	◌ี	ๅ	๕
6	┤	◌็	ฆ	ถ	ฦ	◌ึ	ๆ	๖
7	┼	◌๐	ง	ท	ว	◌ื	๗	๗
8	┴	◌่	จ	ธ	ศ	◌ุ	◌	๘
9	┬	◌๒	ฉ	น	ษ	◌ู	◌๎	๙
A	┼	◌์	ช	บ	ส	◌ฺ	◌๋	๚
B	▮	◌ํ	ซ	ป	ห	◌็	◌๊	◌ํ
C	←	◌๐	ฌ	ผ	ฬ	◌๐	◌์	◌๐
D	↑	◌่	ญ	ฝ	อ	◌่	◌๏	◌่
E	→	◌๒	ฎ	พ	ฮ	◌๒	◌้	◌๒
F	↓	◌๊	ฏ	ฟ	ฯ	฿	◌๑	

3.2.18 Page 254 (space page)

	HEX	8	9	A	B	C	D	E	F
HEX	BIN	1000	1001	1010	1011	1100	1101	1110	1111
0	0000	SP 128	SP 144	SP 160	SP 176	SP 192	SP 208	SP 224	SP 240
1	0001	SP 129	SP 145	SP 161	SP 177	SP 193	SP 209	SP 225	SP 241
2	0010	SP 130	SP 146	SP 162	SP 178	SP 194	SP 210	SP 226	SP 242
3	0011	SP 131	SP 147	SP 163	SP 179	SP 195	SP 211	SP 227	SP 243
4	0100	SP 132	SP 148	SP 164	SP 180	SP 196	SP 212	SP 228	SP 244
5	0101	SP 133	SP 149	SP 165	SP 181	SP 197	SP 213	SP 229	SP 245
6	0110	SP 134	SP 150	SP 166	SP 182	SP 198	SP 214	SP 230	SP 246
7	0111	SP 135	SP 151	SP 167	SP 183	SP 199	SP 215	SP 231	SP 247
8	1000	SP 136	SP 152	SP 168	SP 184	SP 200	SP 216	SP 232	SP 248
9	1001	SP 137	SP 153	SP 169	SP 185	SP 201	SP 217	SP 233	SP 249
A	1010	SP 138	SP 154	SP 170	SP 186	SP 202	SP 218	SP 234	SP 250
B	1011	SP 139	SP 155	SP 171	SP 187	SP 203	SP 219	SP 235	SP 251
C	1100	SP 140	SP 156	SP 172	SP 188	SP 204	SP 220	SP 236	SP 252
D	1101	SP 141	SP 157	SP 173	SP 189	SP 205	SP 221	SP 237	SP 253
E	1110	SP 142	SP 158	SP 174	SP 190	SP 206	SP 222	SP 238	SP 254
F	1111	SP 143	SP 159	SP 175	SP 191	SP 207	SP 223	SP 239	SP 255

3.2.19 Page 255 (space page)

	HEX	8	9	A	B	C	D	E	F
HEX	BIN	1000	1001	1010	1011	1100	1101	1110	1111
0	0000	SP 128	SP 144	SP 160	SP 176	SP 192	SP 208	SP 224	SP 240
1	0001	SP 129	SP 145	SP 161	SP 177	SP 193	SP 209	SP 225	SP 241
2	0010	SP 130	SP 146	SP 162	SP 178	SP 194	SP 210	SP 226	SP 242
3	0011	SP 131	SP 147	SP 163	SP 179	SP 195	SP 211	SP 227	SP 243
4	0100	SP 132	SP 148	SP 164	SP 180	SP 196	SP 212	SP 228	SP 244
5	0101	SP 133	SP 149	SP 165	SP 181	SP 197	SP 213	SP 229	SP 245
6	0110	SP 134	SP 150	SP 166	SP 182	SP 198	SP 214	SP 230	SP 246
7	0111	SP 135	SP 151	SP 167	SP 183	SP 199	SP 215	SP 231	SP 247
8	1000	SP 136	SP 152	SP 168	SP 184	SP 200	SP 216	SP 232	SP 248
9	1001	SP 137	SP 153	SP 169	SP 185	SP 201	SP 217	SP 233	SP 249
A	1010	SP 138	SP 154	SP 170	SP 186	SP 202	SP 218	SP 234	SP 250
B	1011	SP 139	SP 155	SP 171	SP 187	SP 203	SP 219	SP 235	SP 251
C	1100	SP 140	SP 156	SP 172	SP 188	SP 204	SP 220	SP 236	SP 252
D	1101	SP 141	SP 157	SP 173	SP 189	SP 205	SP 221	SP 237	SP 253
E	1110	SP 142	SP 158	SP 174	SP 190	SP 206	SP 222	SP 238	SP 254
F	1111	SP 143	SP 159	SP 175	SP 191	SP 207	SP 223	SP 239	SP 255

3.2.20 International character sets

Country	ASCII code (Hex)											
	23	24	40	5B	5C	5D	5E	60	7B	7C	7D	7E
U.S.A	#	$	@	[	\	]	^	`	{	|	}	~
France	#	$	à	°	ç	§	^	`	é	ù	è	¨
Germany	#	$	§	Ä	Ö	Ü	^	`	ä	ö	ü	ß
U.K.	£	$	@	[	\	]	^	`	{	|	}	~
Denmark I	#	$	@	Æ	Ø	Å	^	`	æ	ø	å	~
Sweden	#	¤	É	Ä	Ö	Å	Ü	é	ä	ö	å	ü
Italy	#	$	@	°	\	é	^	ù	à	ò	è	ì
Spain I	Pt	$	@	¡	Ñ	¿	^	`	¨	ñ	}	~
Japan	#	$	@	[	¥	]	^	`	{	|	}	~
Norway	#	¤	É	Æ	Ø	Å	Ü	é	æ	ø	å	ü
Denmark II	#	$	É	Æ	Ø	Å	Ü	é	æ	ø	å	ü
Spain II	#	$	á	¡	Ñ	¿	é	`	í	ñ	ó	ú
Latin America	#	$	á	¡	Ñ	¿	é	ü	í	ñ	ó	ú
Korea	#	$	@	[	₩	]	^	`	{	|	}	~

3.3 Switches and Buttons

3.3.1 Power switch

The power switch (rocker switch) is located inside the paper roll cover and turns the power on or off.

3.3.2 Panel buttons

FEED button

[Type] Non-locking push button
The **ESC c 5** command enables or disables the panel button. When disabled, the FEED button will not function. However, the panel buttons are enabled regardless of the setting with **ESC c 5** while the printer cover is opened.
This button will turn off the PAPER OUT LED off regardless of the setting with **ESC c 5**. (When this button is used to turn off the LED, paper is not fed.)

[Function] Feeds paper based the line feed amount set by the **ESC 2** and **ESC 3** commands.

3.3.3 DIP switches

1) RS-232 serial interface model

Table 3.3.1 DIP Switch 1

Switch No.	Function	ON	OFF	Default
1	Data reception error	Ignored	Prints "?"	Off
2	Receive buffer capacity	1KB	16KB	Off
3	Handshaking	XON/XOFF	DTR/DSR	Off
4	Word length	7 bit	8 bit	Off
5	Parity check	Yes	No	Off
6	Parity selection	Even	Odd	Off
7	Baud rate selection	4800 bps	9600 bps	Off
8	BUSY condition	•Receive buffer-full	•Offline •Receive buffer-full	Off

[bps: bits per second]

Table 3.3.2 DIP Switch 2

Switch No.	Function	ON	OFF	Default
1	Selects number of characters per line (cpl) 7×9 font / 9×9 font	42 cpl / 35 cpl	40 cpl / 33 cpl	Off
2	For internal use only (*1) (autocutter)	Enabled	Disabled	On
3	Pin 6 reset signal	Used	Not used	Off
4	Pin 25 reset signal	Used	Not used	Off
5	PAPER OUT LED blinking pattern	Blinks	Lights on	On
6	For internal use only (*1) (Flash memory rewriting)	Enabled	Disabled	Off
7	For internal use only (*1) (interface synchronization)	Asynchronous	Synchronous with clock	Off
8	Internal buzzer	Disabled	Enabled	Off

*1: Do not change the settings of DIP switches 2-2, 2-6, and 2-7 from their default settings.

2) Parallel interface model

Table 3.3.3 DIP Switch 1

Switch No.	Function	ON	OFF	Default
1	Auto line feed	Enabled	Disabled	Off
2	Receive buffer	1KB	16KB	Off
3 - 7	Undefined	--	--	Off
8	Busy condition	•Receive buffer-full	•Receive buffer-full •Offline	Off

Table 3.3.4 DIP Switch 2

Switch No.	Function	ON	OFF	Default
1	Selects number of characters per line (cpl) 7 × 9 font / 9 × 9 font	42 cpl / 35 cpl	40 cpl / 33 cpl	Off
2	For internal use only (*1) (autocutter)	Enabled	Disabled	On
3	Undefined	--	--	Off
4	Pin 31 reset signal	Used	Not used	On
5	PAPER OUT LED blinking pattern	Blinks	Lights on	On
6	For internal use only (*1) (Flash memory rewriting)	Enabled	Disabled	Off
7	For internal use only (*1) (interface synchronization)	Asynchronous	Synchronous with clock	Off
8	Internal buzzer	Disabled	Enabled	Off

*1: Do not change the settings of DIP switches 2-2, 2-6, and 2-7 from their default settings.

3) Ethernet interface model

Table 3.3.5 DIP Switch 1

Switch No.	Function	ON	OFF	Default
1	Auto line feed	Enabled	Disabled	Off
2	Receive buffer	1KB	16KB	Off
3 - 7	Undefined	--	--	Off
8	Busy condition	•Receive buffer-full	•Receive buffer-full •Offline	Off

Table 3.3.6 DIP Switch 2

Switch No.	Function	ON	OFF	Default
1	Selects number of characters per line (cpl) 7 × 9 font / 9 × 9 font	42 cpl / 35 cpl	40 cpl / 33 cpl	Off
2	For internal use only (*1) (autocutter)	Enabled	Disabled	On
3	Undefined	--	--	Off
4	Pin 31 reset signal	Used	Not used	On
5	PAPER OUT LED blinking pattern	Blinks	Light stays on	On
6	For internal use only (*1) (Flash memory rewriting)	Enabled	Disabled	Off
7	For internal use only (*1) (interface synchronization)	--	Synchronous with clock	Off
8	Internal buzzer	Disabled	Enabled	Off

*1: Do not change the settings of DIP switches 2-2, 2-6, and 2-7 from their default settings.

3.4 Panel LED Indicators

3.4.1 Panel LED indicators

1) Power supply (POWER) LED: Green

ON: Power supply is stable.

OFF: Power supply is not stable.

2) Paper roll near-end (PAPER OUT) LED: Red

ON: Near-end or end of paper roll is detected.
(The internal buzzer also beeps if the DIP switch 2-8 is off.)

OFF: Adequate paper remains on the paper roll (normal condition).

Hold the FEED button down to light the PAPER OUT LED. (Even if the panel button is set to be ignored, this function is effective.)

3) Error (ERROR) LED: Red

ON: Offline (except during paper feeding using the FEED button and during the self-test).

Blinking: Error state. (See Section 3.5, Error Processing.)

OFF: Normal operation.

NOTE: According to the setting with **ESC (A**, two kinds of the LED lighting are possible:
n = 1: Highlighting of the green LED for giving notice of a receipt issue.
n = 2: Highlighting of the red LED for giving notice of an error or offline state.

3.4.2 Internal Buzzer

The internal buzzer operates as interlocking with the PAPER OUT LED.

* If the internal buzzer is turned off with the buzzer control command **ESC (A**, the PAPER OUT LED does not turn on.

Operation of the internal buzzer

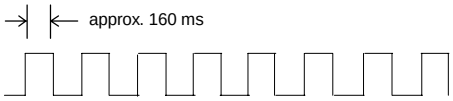
- If the buzzer command **ESC (A** is not used, the internal buzzer beeps only when the paper roll near-end or the paper end is detected.
- If the buzzer command **ESC (A** is used, the operation of the internal buzzer depends on the command setting.

3.5 Error Processing

3.5.1 Error types

1) Error that recovers automatically

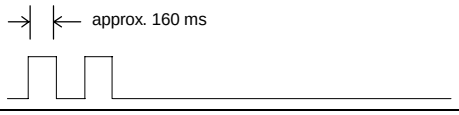
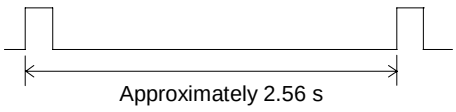
Table 3.5.1 Automatically Recoverable Error

Error	Description	ERROR LED blinking pattern	Recovery
Print head temperature error (*)	Print head temperature is extremely high.		Automatically recovers when the print head temperature falls.

(*) A print head temperature error is not abnormal.

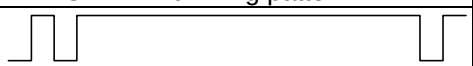
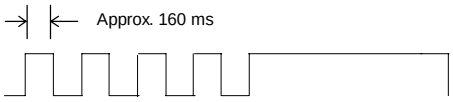
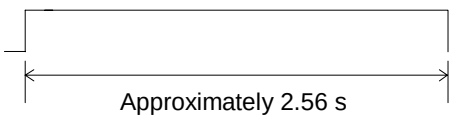
2) Errors that may be recovered via commands

Table 3.5.2 Command-recoverable Errors

Error	Description	ERROR LED blinking pattern	Recovery
Home position detection error (mechanical error)	Home position cannot be detected due to a paper jam or other problem.		Recovers using **DLE ENQ 2.**
Autocutter error	Abnormality in the autocutter.		Recovers using **DLE ENQ 2.**

3) Errors that cannot be recovered

Table 3.5.3 Unrecoverable Errors

Error	Description	ERROR LED blinking pattern	Recovery
R/W error in memory	After R/W checking, the printer does not work correctly.		Impossible to recover.
CPU execution error	CPU executes incorrect address.		Impossible to recover.
High voltage error	Power voltage is extremely high.		Impossible to recover.
Low voltage error	Power voltage is extremely low.		Impossible to recover.
Print head temperature detection circuit error	Abnormality in the mechanism or circuit connection. Or abnormality in the print head temperature.		Impossible to recover.

NOTE: If an error that cannot be recovered occurs, turn off the power as soon as possible.

3.5.2 Operation when an error is detected

The printer executes the following operations when detecting an error:

<Serial interface model>

- Stops all mechanical operations.
- Sets the DTR signal to MARK.
- Blinks the ERROR LED
- Transmits XOFF if XON/XOFF control is selected.

<Parallel interface model>

- Stops all mechanical operations.
- Sets the Busy signal to HIGH.
- Blinks the ERROR LED.
- Sets the nFault signal to LOW.

3.5.3 Data reception error

If any of the following data reception errors occur during serial interface communication, the printer prints " ? " or ignores the data, based on the setting of DIP switch 1-1.

- Parity error
- Framing error
- Overrun error

3.6 Self-test

1) The printer has a self-test function that checks the following mainly:

- Control circuit functions
- Printer mechanism
- Print quality
- Control ROM version
- DIP switch settings

2) Self-test on paper roll

[Starting the self-test]

To start the self-test on a paper roll, hold down the FEED button and turn on the printer with the paper roll cover opened. The printer then prints the current printer status, which provides the following information:

- Control ROM version
- DIP switch settings

[Self-test standby state]

After printing the current printer status, the printer prints the message "If you want to continue SELF-TEST printing, please press FEED button." The PAPER OUT LED blinks, and the printer enters the test printing standby state.

Press the FEED button in this state to start test printing.

3) Ending the self-test

After a number of lines are printed, the printer indicates the end of the self-test by printing "*** completed ***," performs initialization, and then goes to normal mode.

3.7 Hexadecimal Dump

1) Hexadecimal dump function

This function prints the data transmitted from the host in hexadecimal numbers and their corresponding characters.

2) Starting hexadecimal dumping

Turn the printer power on while pressing the FEED button when the cutter cover is opened. Then, close the cover, the printer first prints "Hexadecimal Dump" on the paper roll, and prints the data received thereafter in hexadecimal numbers and their corresponding characters. The hexadecimal dump is also executed with the **GS (A** command.

NOTES: 1. "." is printed if no printable character corresponds to the data received.
2. During the hexadecimal dump, all commands except **DLE EOT** and **DLE ENQ** are disabled.
3. Insufficient print data to fill the last line can be printed by setting the printer offline.

3) Ending hexadecimal dump

End the hexadecimal dump either by turning off the power, or by pressing the FEED button three times, or by resetting the printer after printing is finished.

< Example printing >

```
Hexadecimal Dump
To terminate hexadecimal dump,
press FEED button three times.



1B 40 1B 21 30 41 42 43  :  .  @ . ! 0 A B C
44 45 46 47 0A           :  D E  F  G .

                *** completed ***
```

3.8 Paper Detectors

The printer has the following paper detectors:

- Paper roll end detector
- Paper roll near-end detector

3.8.1 Detectors and LED indicators

1) Paper roll end detector

This detector is located in the roll paper path. This detector detects paper out. When the paper out is detected, the PAPER OUT LED lights and the internal buzzer beeps. However, if the paper roll core and paper are attached to each other by tape or glue, the paper end cannot be detected. When the printer detects the paper end, it stops printing and lets the user exchange the paper roll with a new one.

2) Paper roll near-end detector

This sensor is installed on the paper roll supply device. It detects a paper near-end by monitoring the paper roll diameter. The PAPER OUT LED lights and the internal buzzer beeps when the paper roll diameter becomes sufficiently small.

* The PAPER OUT LED won't turn on if the buzzer off is set with the buzzer command **ESC (A**.

3.8.2 Detectors and printing

When the printer detects a paper near-end, it stops or continues printing, depending on the **ESC c 4** command setting. The roll paper detector always halts printing when there is no paper.

3.9 Cover open detector

The cover open detector monitors the cutter cover. When the printer detects a cover open, the printer stops printing immediately and automatically goes offline. When the cutter cover is closed, the printer goes online.

3.10 Buffer-full Printing

When subsequent data is received after the printer processes one line of data in the print buffer, the printer automatically prints the processed line and feeds the paper by one line.

3.11 Loading the Paper Roll

Make sure to load the paper roll correctly according to the description on the caution label attached inside the printer cover. After you insert the paper in the paper entrance, the printer loads the paper automatically; then close the cover. Confirm that the PAPER OUT LED is flashing, and then press the FEED button. The PAPER OUT LED stops flashing and the printer goes back online, ready to print.

4. CASE SPECIFICATIONS

4.1 External Dimensions and Mass

Height: 259.5 mm {10.2"}
Width: 166 mm {6.5"}
Depth: 168 mm {6.6"}
Mass: Approximately 2.8 kg {6.17 lb}

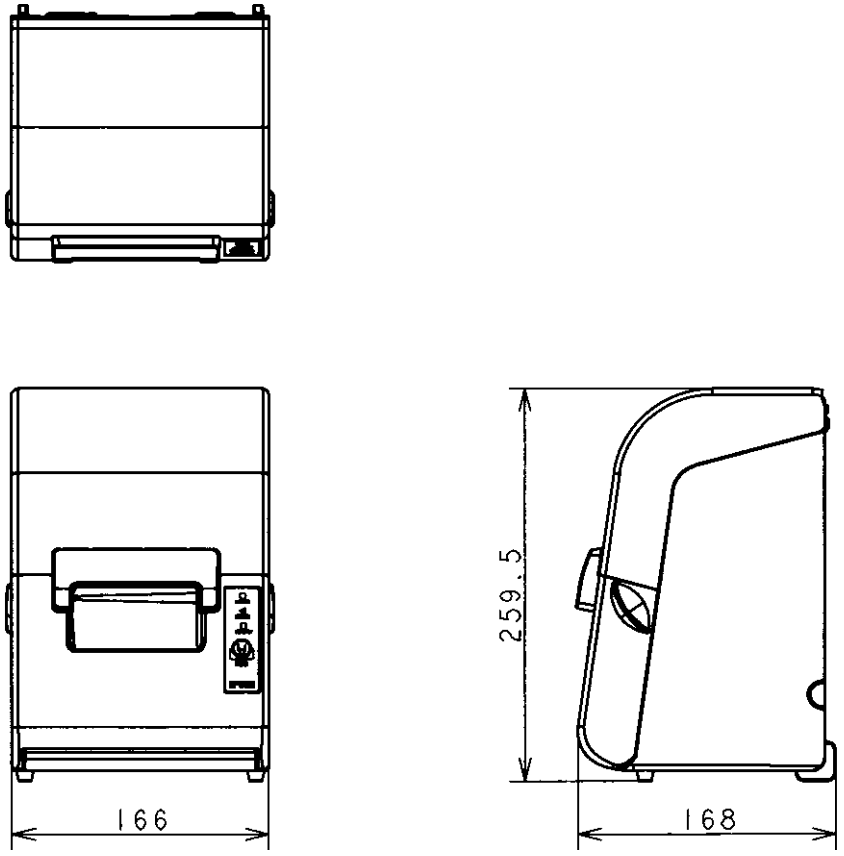
4.2 Color

EPSON standard color

4.3 Finish

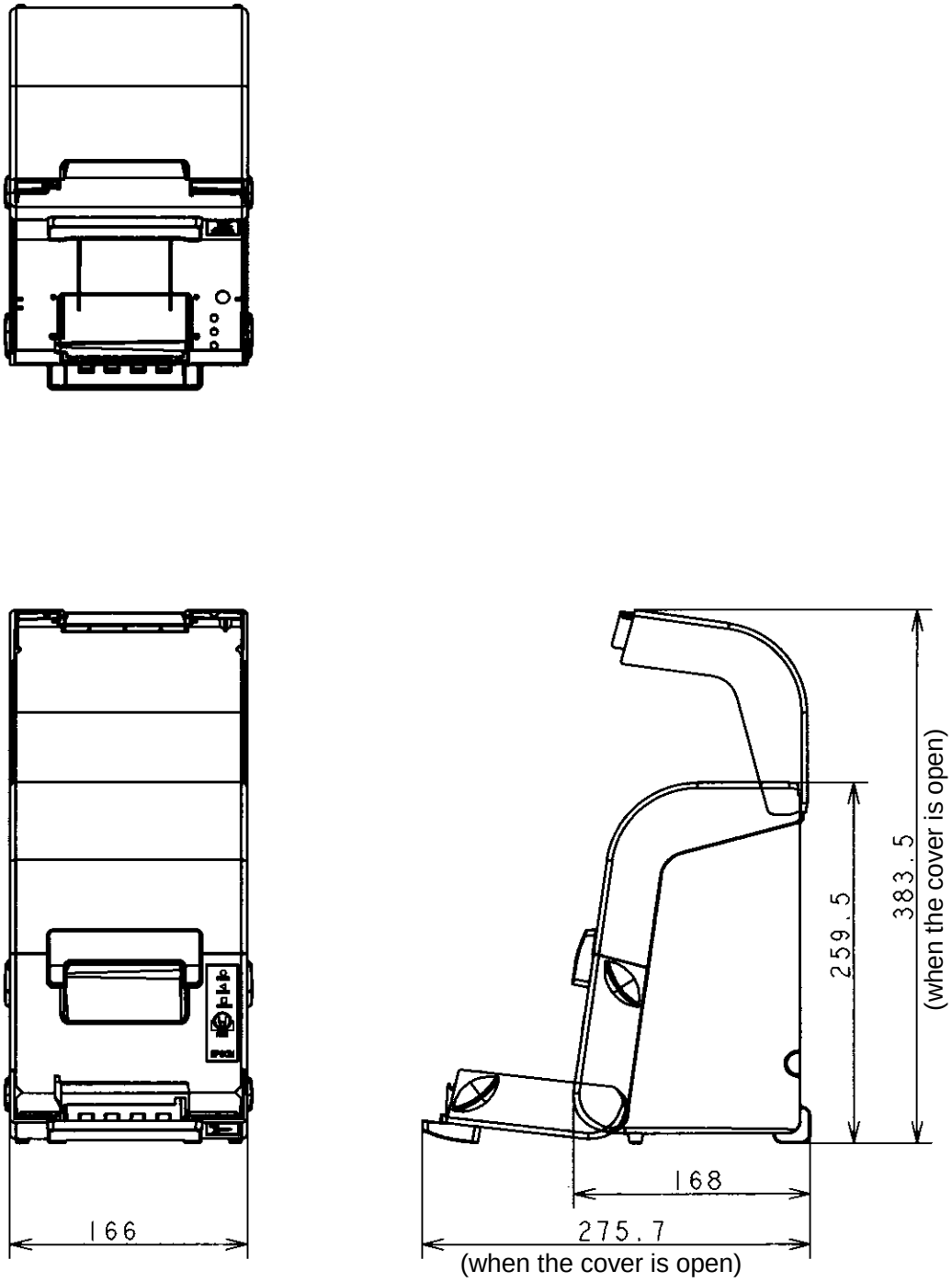
Fine coating (for model with coating only)

4.4 External Appearance



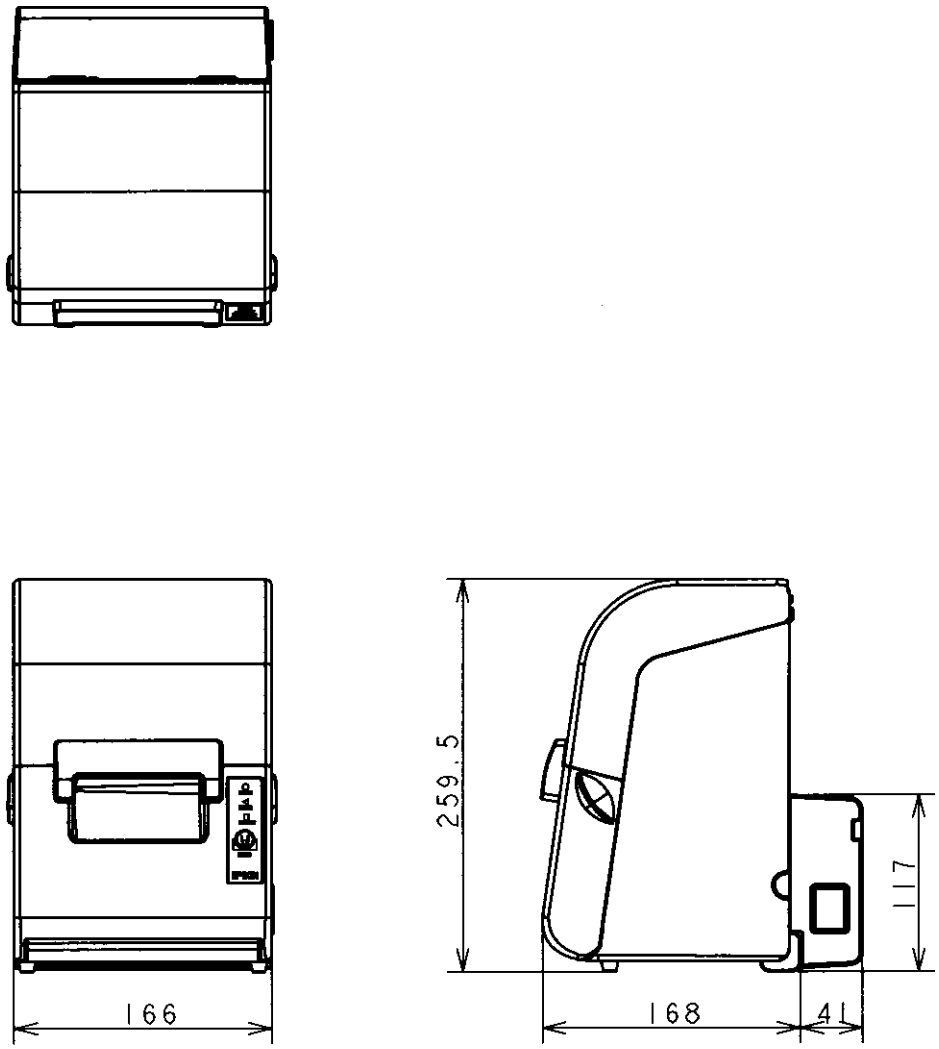
[Units: mm]

Figure 4.3.1 External Appearance (without the power supply cover)



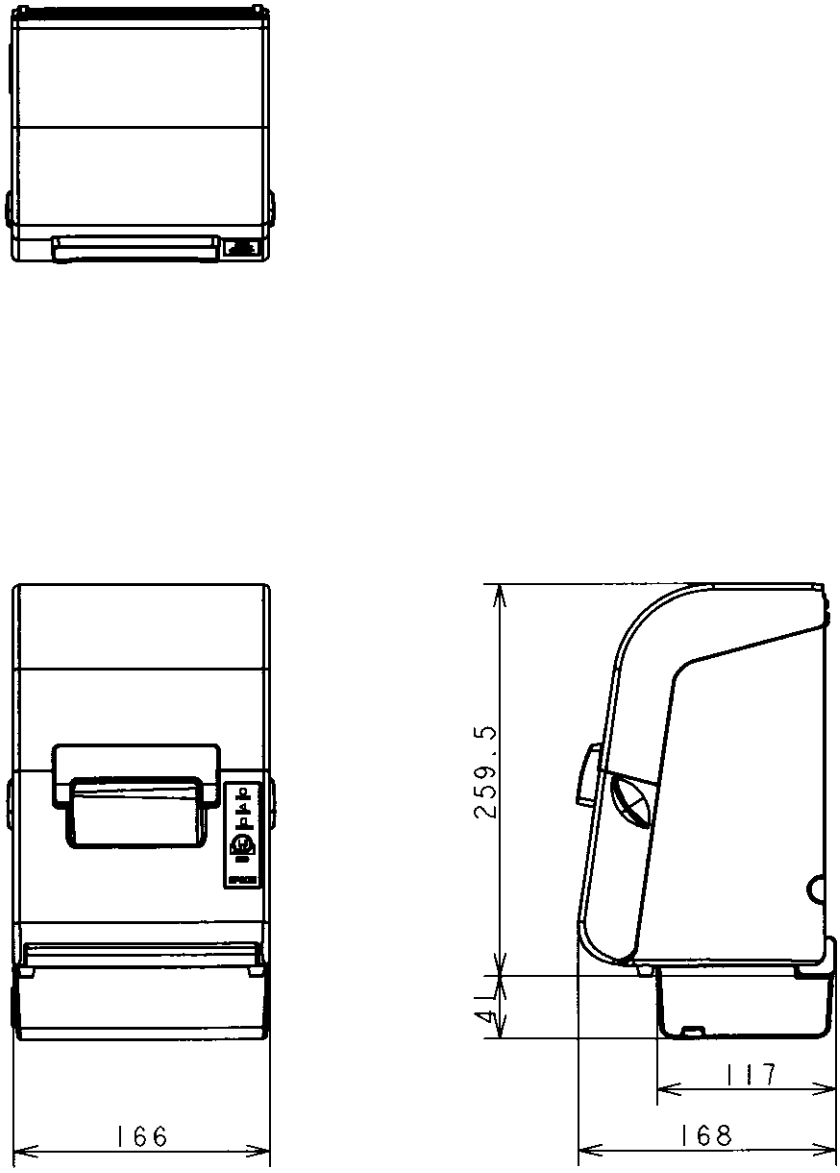
[Units: mm]

Figure 4.3.2 External Appearance (When the Cover is Opened)



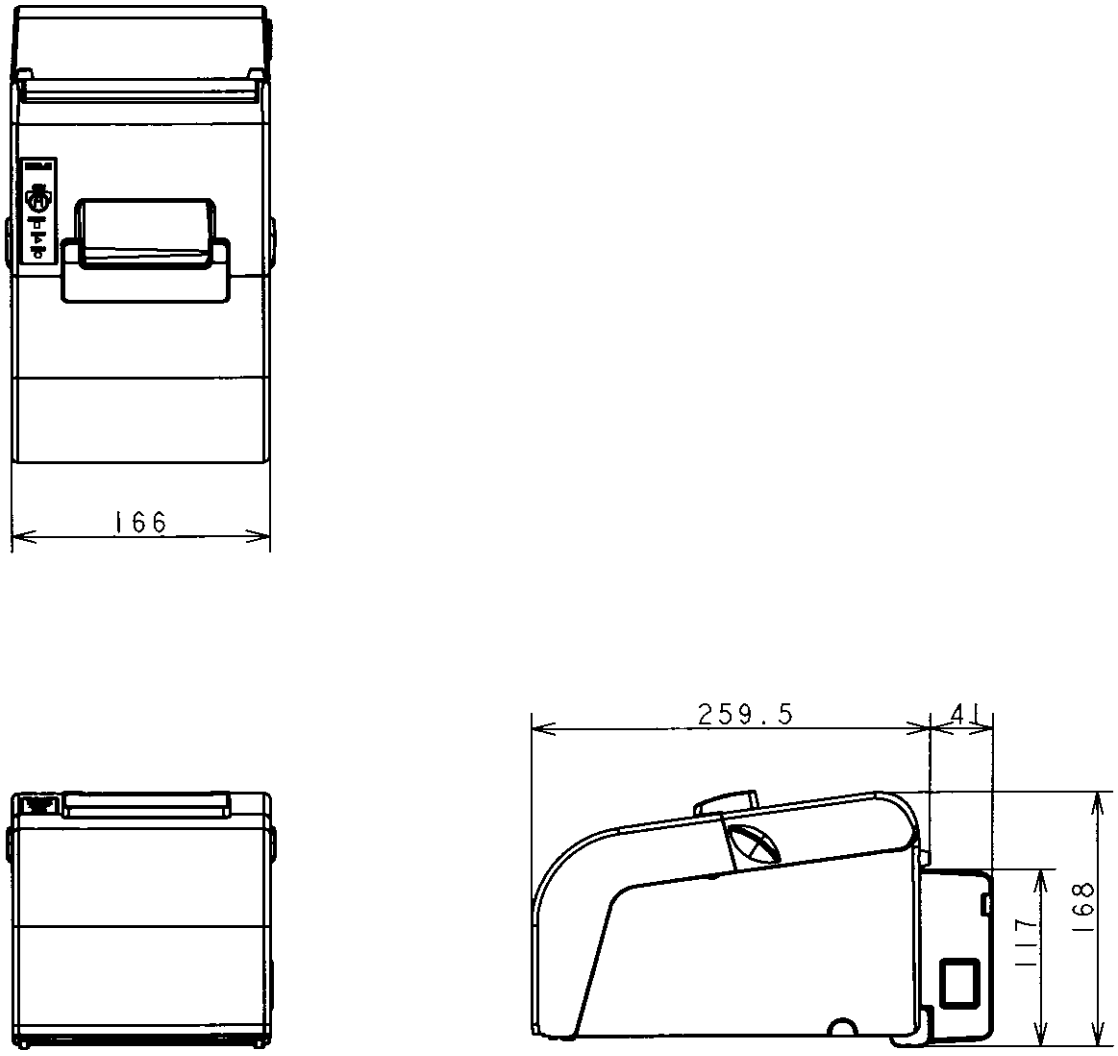
[Units: mm]

Figure 4.3.3 External Appearance (Placed on the Desk with the Power Supply Cover)



[Units: mm]

Figure 4.3.4 External Appearance (Hanging on the Wall with the Power Supply Cover)



[Units: mm]

Figure 4.3.5 External Appearance (Placed Horizontally with the Power Supply Cover)

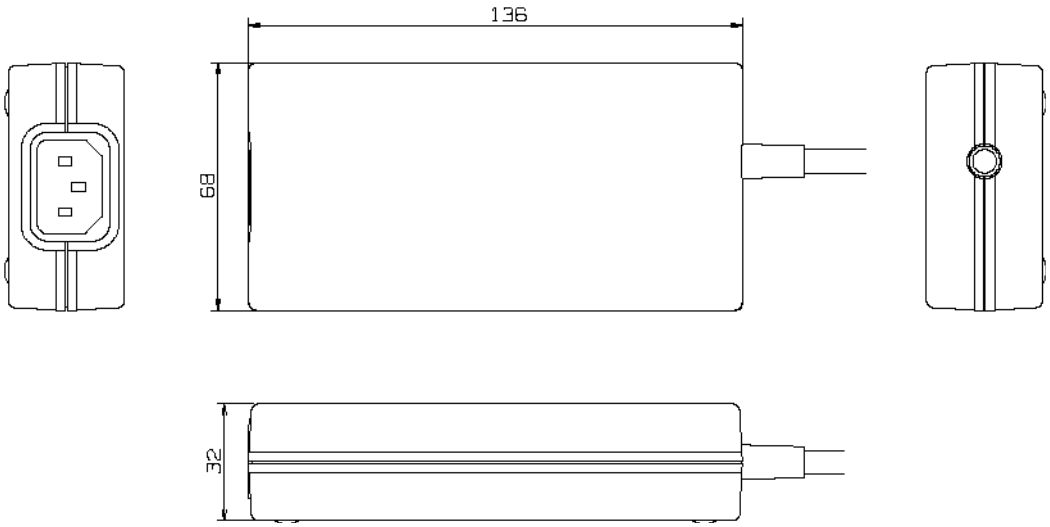
5. ACCESSORIES AND OPTIONS

5.1 Standard Accessories

- Exclusive ribbon cassette (ERC-38(B/R))
- Paper roll
- User's manual
- Switch panel sheet for a horizontal installation
- AC adapter PS-180 / Exclusive power supply cover
  (models with/without an exclusive power supply cover are available)

5.1.1 AC adapter PS-180 External Dimensions and Mass

External dimensions:	Approximately 136 (L) × 68 (D) × 32 (H) mm
Mass:	Approximately 0.4 kg {0.88 lb} (except AC cable)
Material:	Flammability rating V0
Color:	Black



NOTES:
- AC cable is not packaged in the box.
  Make sure to use the AC cable to satisfy the following specifications:
  - Safety standards are applied.
  - The plug connector has a PE (Power Earth) terminal.
- Make sure to ground for safety.

5.2 Options

Options are available separately from the printer.

- Wall mounting bracket WH-10
- AC adapter: Model is available, which is packed with the printer.

AC adapter model	Input condition (rating)			Output condition (rating)		Sold to
	Input voltage	Frequency (Hz)	Capacity (VA)	Output voltage (V) (at rating current)	Output current (A)	
PS-180	90 (100-10%) ~ 264 (230+15%)	47~63	100	24.0 ± 5%	2.0	Worldwide

5.3 Interface Board

- IEEE 1284 interface board (bidirectional parallel)
- RS-232 interface board
- RS-485 interface board
- USB interface board
- 10Base-T Ethernet interface board

6. COMMANDS

6.1 Command Notation

XXXX

[Name] The name of the command.

[Format] The code sequence.

[Range] Gives the allowable ranges for the arguments.

[Description] Describes the command's function.

[Details] Describes the usage of the command in detail.

[Notes] Provides important information on setting and using the printer command, if necessary.

[Default] Gives the default values, (if any) for the command arguments.

[Reference] Lists related commands.

[Example] Gives examples of how to use the command.

Hex indicates the hexadecimal equivalents.

Decimal indicates the decimal equivalents.

[ ]*k* indicates the contents of the [ ] should be repeated *k* times.

6.2 Explanation of Terms

1) Receive buffer

The receive buffer is a buffer that stores, as is, the data received from the host (the receive data). The receive data is stored in the receive buffer temporarily, and is then processed sequentially.

2) Print buffer

The print buffer is a buffer that stores the image data to be printed.

3) Print buffer full

This is the state where the print buffer is full. If new print data is input while the print buffer is full, the data in the print buffer is printed out and a line feed is executed. This is the same operation as the **LF** operation.

4) Start of line

The start of line state satisfies the following conditions:

- There is no print data (including spaces and portions of data skipped due to **HT**) currently in the print buffer.

5) Printable area

The maximum range within which printing is possible under the printer specifications. The printable area for this printer is 400/160 inches {2.5"} or 63.5 mm.

6) Ignore

The state in which all codes, including parameters, are read in and discarded, and nothing happens.

7) Invalid

The state in which the command portion of codes is read in and discarded, while the parameter portion of codes is treated as normal data.

8) Inch

A unit of length. One inch is 25.4 mm.

9) MSB

Most Significant Bit

10) LSB

Least Significant Bit

6.3 Command Descriptions

HT

[Name] Horizontal tab

[Format]

ASCII	HT
Hex	09
Decimal	10

[Description] Moves the print position to the next horizontal tab position.

[Notes]
- This command is ignored unless the next horizontal tab position has been set.
- If the next horizontal tab position is outside the printing area, the printing position shifts to "printing area width + 1."
- Horizontal tab positions are set with **ESC D**.
- The default tab positions are at intervals of 8 characters (columns 9, 17, 25) for font B (7×9).

[Reference] **ESC D**

LF

[Name] Print and line feed

[Format]

ASCII	LF
Hex	0A
Decimal	10

[Description] Prints the data in the print buffer and feeds one line, based on the current line spacing.

[Note] This command sets the print position to the beginning of the line.

[Reference] **ESC 2, ESC 3**

CR

[Name] Print and carriage return

[Format]

ASCII	CR
Hex	0D
Decimal	13

[Description] ① For the serial interface model

- This command prints the data in the print buffer and does not feed the paper.

② For the parallel/Ethernet interface model

- When auto-line feed is enabled, this command functions in the same way as LF. When auto-line feed is disabled, this command is disregarded.

[Note] Sets the print starting position to the beginning of the line.

[Reference] **LF**

DLE EOT *n*

[Name] Real-time status transmission

[Format]

ASCII	DLE	EOT	*n*
Hex	10	04	*n*
Decimal	16	4	*n*

[Range] $1 \leq n \leq 4$

[Description] Transmits the selected printer status specified by *n* in real time, according to the following parameters:

n = 1: Transmit printer status
n = 2: Transmit offline status
n = 3: Transmit error status
n = 4: Transmit paper roll sensor status

[Details]

- When transmitting status, the printer transmits only 1 byte without confirming the condition of the DSR signal.
- The printer executes this command upon receiving it.
- This command is executed even when the printer is busy (offline, the receive buffer is full, or there is an error).
- It depends on the type of interface whether the printer can receive this command or not when the printer is busy. Refer to Appendix F for details.
- When Auto Status Back (ASB) is enabled using the **GS a** command, the status transmitted by the **DLE EOT** command and the ASB status must be differentiated by using the table in Appendix E.
- This command is effective even if the printer is not selected by the set peripheral device command, **ESC =**.

[Notes]

- The status is transmitted whenever the data sequence <10>H<04>H<*n*> ($1 \leq n \leq 4$) is received. For example,
  In **ESC ∗ *m nL nH [d] nL+256nH***, *d1*=<10>H, *d2*=<04>H, *d3*=<01>H
- This command should not be used within the data sequence of another command that consists of 2 or more bytes. For example,
  If you attempt to transmit **ESC 3 *n*** to the printer, but DTR (DSR for the host computer) goes to MARK before n is transmitted and then **DLE EOT 3** interrupts before n is received, the code <10>H for **DLE EOT 3** is processed as the code for **ESC 3** <10>H.

n = 1: Printer status

Bit	Off/On	Hex	Decimal	Function
0	Off	00	0	Not used. Fixed to Off.
1	On	02	2	Not used. Fixed to On.
2	Off	00	0	Drawer kick-out signal is LOW (connector pin 3).
	On	04	4	Drawer kick-out signal is HIGH (connector pin 3).
3	Off	00	0	Online.
	On	08	8	Offline.
4	On	10	16	Not used. Fixed to On.
5	Off	00	0	Not waiting for offline recovery.
	On	20	32	Waiting for offline recovery.
6	-	-	-	Undefined.
7	Off	00	0	Not used. Fixed to Off.

n = 2: Offline status

Bit	Off/On	Hex	Decimal	Function
0	Off	00	0	Not used. Fixed to Off.
1	On	02	2	Not used. Fixed to On.
2	Off	00	0	The cover is closed.
	On	04	4	The cover is opened.
3	Off	00	0	Paper is not being fed by using the paper FEED button.
	On	08	8	Paper is being fed by the paper FEED button.
4	On	10	16	Not used. Fixed to On.
5	Off	00	0	No paper-end stop.
	On	20	32	Printing stops due to paper end.
6	Off	00	0	No error.
	On	40	64	Error occurs.
7	Off	00	0	Not used. Fixed to Off.

Bit 5: On (printing stops due to paper-end). This occurs when printing stops due to paper-end detected by the paper-end sensor or the paper near-end enabled by using the **ESC c 4**.

n = 3: Error status

Bit	Off/On	Hex	Decimal	Function
0	Off	00	0	Not used. Fixed to Off.
1	On	02	2	Not used. Fixed to On.
2	Off	00	0	No mechanical error.
	On	04	4	Mechanical error occurred.
3	Off	00	0	No autocutter error.
	On	08	8	Autocutter error occurs.
4	On	10	16	Not used. Fixed to On.
5	Off	00	0	Unrecoverable error.
	On	20	32	Recoverable error.
6	Off	00	0	Automatic recover error.
	On	40	64	No automatic recover error.
7	Off	00	0	Not used. Fixed to Off.

Bit 2: If these errors occur due to paper jams or the like, it is possible to recover by correcting the cause of the error and executing **DLE ENQ 2**. If an error due to a circuit failure (e.g., wire break) occurs, it is impossible to recover.

Bit 6: If the print head temperature becomes high, bit 6 is transmitted until the print head temperature drops sufficiently. The printer automatically recovers from this error.

n = 4: Continuous paper sensor status

Bit	Off/On	Hex	Decimal	Function
0	Off	00	0	Not used. Fixed to Off.
1	On	02	2	Not used. Fixed to On.
2,3	Off	00	0	Paper near-end sensor. Paper adequate.
	On	0C	12	Paper near-end is detected by the paper near-end sensor.
4	On	10	16	Not used. Fixed to On
5,6	Off	00	0	Paper end sensor. Paper adequate.
	On	60	96	Paper end is detected by the paper end sensor.
7	Off	00	0	Not used. Fixed to Off.

[Reference] **DLE ENQ, GS a, GS r**, 3.5.1, Error types, Appendix E

DLE ENQ *n*

[Name] Real-time request to printer

[Format]

ASCII	DLE	ENQ	*n*
Hex	10	05	*n*
Decimal	16	5	*n*

[Range] *n* = 0, *n* = 2

[Description] The printer responds to a request from the host specified by *n*.

n = 0: Recovers to online state.
n = 2: Recovers from an error after clearing the receive and print buffers.

[Details]

- When the printer is offline because printing was stopped due to a lack of paper, this command *n* = 0 is valid from the point when paper is loaded until the printer goes online again (the "waiting for online recovery" state), while in other cases requests are ignored.
- This command *n* = 2 is valid only when a mechanical error or an autocutter error has occurred.
- The printer executes this command upon receiving it.
- It depends on the type of interfaces whether the printer can receive this command or not when the printer is busy. Refer to Appendix F, for details.
- **DLE ENQ 2** enables the printer to recover from an error after clearing the data in the receive buffer and the print buffer. The printer retains the settings (by **ESC !, ESC 3**, etc.) in effect when the error occurred. The printer can be initialized completely by using this command and **ESC** @. This command is enabled only for errors that have the possibility of recovery, except for print head temperature errors.
- This command is effective even if the printer is not selected by the set peripheral device command, **ESC =**.

[Notes]

- The status is also transmitted whenever the data sequence of <10>H<05>H<*n*> *n* = 2 is received. For example,

  In **ESC ∗ *m nL nH [d] nL+256nH***, *d1*=<10>H, *d2*=<05>H, *d3*=<1>H
- This command should not be used within the data sequence of another command that consists of two or more bytes. For example,

  If you attempt to transmit **ESC 3 *n*** to the printer, but DTR (DSR for the host computer) goes to MARK before *n* is transmitted, and **DLE ENQ 2** interrupts before *n* is received, the code <10>H for **DLE ENQ 2** is processed as the code for **ESC 3** <10>H.

[Reference] **DLE EOT**, **GS z 0**

ESC SP *n*

[Name] Set right-side character spacing

[Format]

ASCII	ESC	SP	*n*
Hex	1B	20	*n*
Decimal	27	32	*n*

[Range] $0 \le n \le 255$

[Description] Sets the character spacing for the right side of the character to [$n \times 0.159$ mm {1/160"}].

[Details]
- The right-side character spacing for double-width mode is twice the normal value.

[Default] $n = 0$

ESC ! *n*

[Name] Select print mode(s)

[Format]

ASCII	ESC	!	*n*
Hex	1B	21	*n*
Decimal	27	33	*n*

[Range] $0 \le n \le 255$

[Description] Selects print mode(s) using *n* as follows:

Bit	Off/On	Hex	Decimal	Function
0	Off	00	0	Character font A (9 × 9) selected.
	On	01	1	Character font B (7 × 9) selected.
1	-	-	-	Undefined.
2	-	-	-	Undefined.
3	Off	00	0	Emphasized mode not selected.
	On	08	8	Emphasized mode selected.
4	Off	00	0	Double-height mode not selected.
	On	10	16	Double-height mode selected.
5	Off	00	0	Double-width mode not selected.
	On	20	32	Double-width mode selected.
6	-	-	-	Undefined.
7	Off	00	0	Underline mode not selected.
	On	80	128	Underline mode selected.

[Details]
- When both double-height and double-width modes are selected, quadruple-size characters are printed.
- Underlining is added to the entire width of each character, including the space to the right of a character, but is not added to portions of lines that were skipped by means of an **HT**.
- The underline setting by this command does not affect the Kanji character printing.

[Default] $n = 1$

[Reference] **ESC E, ESC –**

ESC % *n*

[Name] Select/cancel user-defined character set

[Format]

ASCII	ESC	%	*n*
Hex	1B	25	*n*
Decimal	27	37	*n*

[Range] $0 \le n \le 255$

[Description] Selects or cancels the user-defined character set.

When the Least Significant Bit (LSB) is 0, the user-defined character set is canceled and the internal character set is enabled.

When the LSB is 1, the user-defined character set is selected.

[Details]
- Only the least significant bit of *n* is valid.
- When the downloaded character set has been released, the internal character set is specified automatically.

[Default] *n* = 0

[Reference] **ESC &, ESC ?**

ESC & *y c1 c2 [x1 d1...d(y × x1)]...[xk d1... d(y × xk)]*

[Name] Define user-defined characters

[Format]

ASCII	ESC	&	*y c1 c2 [x1 d1...d(y × x1)]...[xk d1... d(y × xk)]*
Hex	1B	26	*y c1 c2 [x1 d1...d(y × x1)]...[xk d1... d(y × xk)]*
Decimal	27	38	*y c1 c2 [x1 d1...d(y × x1)]...[xk d1... d(y × xk)]*

[Range]
$y = 2$
$32 \le c1 \le c2 \le 126$
$0 \le x \le 12$ (9×9 font)
$0 \le x \le 9$ (7×9 font)
$0 \le d1 \ldots d(y \times x) \le 255$

[Description] Defines user-defined characters.

- *y* specifies the number of bytes in the vertical direction.
- *c1* specifies the beginning character code for the definition, and *c2* specifies the final code. When only one character is desired, use *c1 = c2*.
- *x* specifies the number of dots in the horizontal direction.

[Details]

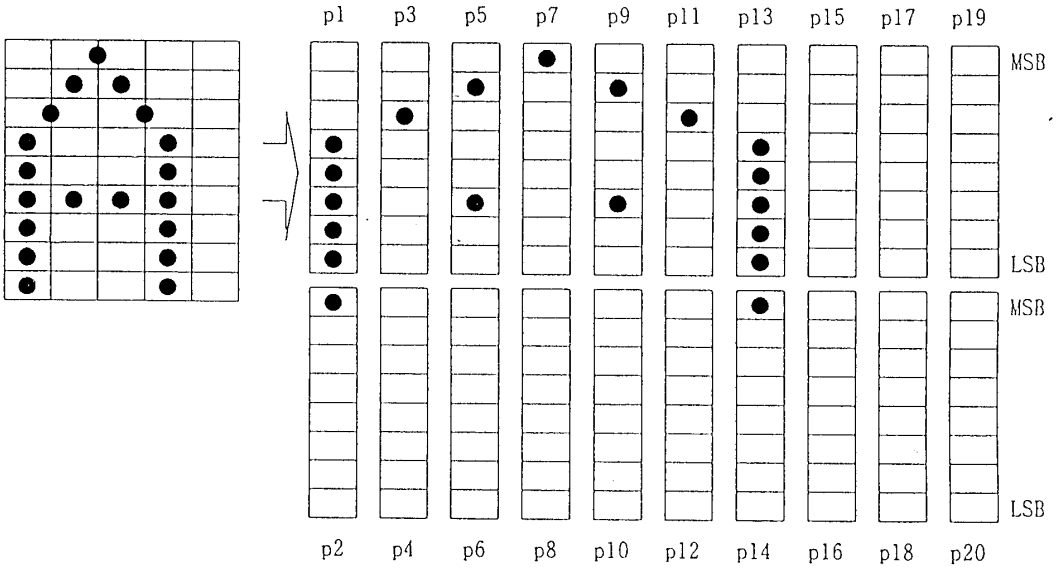
- The range of definable character codes extends from 20H to 7EH among the ASCII codes.
- Consecutive character codes for multiple characters can be defined in one definition. When specifying only one character, specify *c1 = c2.*
- "*d*" is definition data that indicates the pattern for "*x*" dots in the horizontal direction starting from the left edge. If "*x*" does not satisfy the number of dots in the character configuration pattern, the remaining dots on the right are spaces.
- The number of bytes required to download a character definition for one character is "*y*" × "*x*."
- In the definition data, a "1" represents a dot that is to be printed, and a "0" represents a dot that is not to be printed.
- Independent downloaded character definitions are possible for each font. The font is selected by the **ESC !** command.
- The defined downloaded characters are cleared in the following circumstances:
  1) When **ESC** @ is executed.
  2) When deleted by **ESC ?.**
  3) When the printer is reset or turned off.
- The maximum number of characters that can be defined is 19 (8 for the multilingual supporting model).

- If downloaded characters equal to the number of characters that can be defined have already been downloaded, redefinition of the defined ASCII codes is possible, but definition of new ASCII codes is not possible.

[Default] The internal character set

[Reference] **ESC %, ESC ?**

[Example] 7 × 9 font when the dot pattern for code 20H is defined as shown below.



When the dot pattern for code 20H is defined as shown above.

	ESC	&	y	c1	c2	X	p1	p2	p3	d4	p5	p6	p7	p8	p9	p10	p11	p12	p13	p14
Code	1B	26	02	20	20	07	1F	80	20	00	44	00	80	00	44	00	20	00	1F	80

The corresponding bit is 1 when printing and 0 when not printing.

ESC (A *pL pH fn [parameter]*

[Name] Control beeper tones

[Format]

ASCII	ESC	(	A	*pL*	*pH*	*fn*	*[parameter]*
Hex	1B	28	41	*pL*	*pH*	*fn*	*[parameter]*
Decimal	27	40	65	*pL*	*pH*	*fn*	*[parameter]*

[Description] Controls beeper tones, according to the function code (*fn*):

fn	Format	Function number	Function
97	**ESC (A *pL pH fn n c t1 t2***	Function 97	Beeps the internal buzzer.
98	**ESC (A *pL pH fn a bn c t1 t2***	Function 98	Beeps the internal buzzer when the printer goes offline.
99	**ESC (A *pL pH fn a b n c t1 t2***	Function 99	Beeps the internal buzzer except when the printer goes offline.

[Notes]

- This command is effective when DIP switch 2-8 is off.
- When the internal buzzer beeps, the PAPER OUT LED also blinks.
- If the printer is waiting online after loading paper or the printer enters the self-test printing standby state, the process for them are prior to the internal buzzer (PAPER OUT LED) control process even if its event occurs. (PAPER OUT LED blinks for 640 ms cycle, and the internal buzzer also beeps for 640 ms cycle)

<Function 97> **ESC (A *pL pH fn n c t1 t2***

[Format]	ASCII	ESC	(	A	*pL*	*pH*	*fn*	*n*	*c*	*t1*	*t2*
	Hex	1B	28	41	*pL*	*pH*	*fn*	*n*	*c*	*t1*	*t2*
	Decimal	27	40	65	*pL*	*pH*	*fn*	*n*	*c*	*t1*	*t2*

[Range] $(pL + pH \times 256) = 2$ $((pL = 5, pH = 0)$
$fn = 97$
$n = 100$
$1 \le c \le 63$
$1 \le t1 \le 255$
$1 \le t2 \le 255$

[Description]
- Beeps a sound *c* times for the length of time of $t1 \times 100$ ms to be on and $t2 \times 100$ ms to be off.
- *c* specifies the number of times for the beeper.
- *t1* specifies the length of the sound as $t1 \times 100$ ms.
- *t2* specifies the length of the sound as $t2 \times 100$ ms.
- When the following conditions are satisfied, this command begins to process.
  a) If this command is newly processed during beeping the buzzer, the current process for beeping the buzzer is stopped and the new process for beeping the buzzer is started.
- The beeper is stopped when either of the following conditions is satisfied:
  a) When the beeper has repeated the specified times by *c*.
  b) When an event that makes the printer go offline occurs, which can be specified with Function 98.
  c) When the power is off or the hardware reset is enabled.
  d) When an event specified with Function 99 occurs.

<Function 98> **ESC (A *pL pH fn a b n c t1 t2***

[Format]

ASCII	ESC	(	A	*pL*	*pH*	*fn*	*a*	*b*	*n*	*c*	*t1*	*t2*
Hex	1B	28	41	*pL*	*pH*	*fn*	*a*	*b*	*n*	*c*	*t1*	*t2*
Decimal	27	40	65	*pL*	*pH*	*fn*	*a*	*b*	*n*	*c*	*t1*	*t2*

[Range] ($pL + pH \times 256$) = 7 (pL = 7, pH = 0)
fn = 98
$48 \leq a \leq 51$
b = 1
n = 100
c = 0, c = 255
$1 \leq t1 \leq 50$, $t1$ = 255
$1 \leq t2 \leq 50$

[Default] Beeps the internal buzzer based on the setting of the DIP SW2-5 if the printer stops when the paper end is detected. Does not beep the internal buzzer except when other offline conditions except the above occur.

Offline factor (*a*)	Type of beeper (*c*)	Period to beep (*t1*)	Period not to beep (*t2*)	Remarks
48	0	--	--	Does not beep the internal buzzer.
49	255	Depends on the setting of DIP SW2-5.	Depends on the setting of DIP SW2-5.	Beeps the internal buzzer.
50	0	--	--	Does not beep the internal buzzer.
51	0	--	--	Does not beeps the internal buzzer.

DIP SW2-5: On = Repeats beep for 640 ms and silence for 640 ms
Off = Beeps continuously

[Description]
- Beeps the internal buzzer when the specific offline condition occurs.
- *a* specifies the offline condition as follows:

a	Offline condition
48	Cover is open.
49	Printing is stopped due to paper end.
50	Recoverable error occurs.
51	Unrecoverable error occurs.

- *c* specifies the type of beeper.
  c = 0: Does not beep the internal buzzer.
  c = 255: Beeps the internal buzzer infinitely.
- *t1* specifies the period to beep as ($t1 \times 100$) ms.
  t1 = 255: Specifies infinite.
- *t2* specifies the period not to beep as ($t2 \times 100$) ms.

- Ends beeping of the internal buzzer when either one of the following processes is performed:
  a) Releasing the offline condition
  b) Pressing the FEED button (except in an unrecoverable error)
    - After pressing the FEED button, the printer does not beep until another beep condition comes again after the previous condition is removed.
    - This function is enabled even if the panel buttons are disabled by **ESC c 5**.
- The setting values of this command are continuously effective until either of the following conditions is executed.
  a) Resetting by this command.
  b) A command that causes a software reset is executed.
  c) Power off or hardware reset.
- The setting values of this command are not initialized with **ESC** @.
- When another offline condition occurs while an operation caused by the current offline condition is processed, the printer processes the current offline condition with a high priority.
- If multiple offline conditions occur simultaneously, the printer processes them in order, as follows:
  ① Unrecoverable error
  ② Recoverable error
  ③ Cover open
  ④ Printing stop due to paper end

[Notes]
- The PAPER OUT LED does not turn on, even if the paper end is detected when the parameters are set as follows:
  a = 49: Printer is stopped due to paper end
  c = 0: Does not beep the internal buzzer

[Reference] **ESC c 4**

<Function 99> **ESC (A *pL pH fn a b n c t1 t2***

[Format]

ASCII	ESC	(	A	*pL*	*pH*	*fn*	*a*	*b*	*n*	*c*	*t1*	*t2*
Hex	1B	28	41	*pL*	*pH*	*fn*	*a*	*b*	*n*	*c*	*t1*	*t2*
Decimal	27	40	65	*pL*	*pH*	*fn*	*a*	*b*	*n*	*c*	*t1*	*t2*

[Range] ($pL + pH \times 256$) = 7 (pL = 7, pH = 0)
fn = 99
a = 48
b = 1
n = 100
c = 0, *c* = 255
$1 \le t1 \le 50$, *t1* = 255
$1 \le t2 \le 50$

[Default] Beeps the internal buzzer according to the setting of the DIP SW2-5 if the printer stops when the paper near end is detected.
Does not beep the internal buzzer except when other offline factors except above occur.

Offline factor (*a*)	Type of beeper (*c*)	Period to beep (*t1*)	Period not to beep (*t2*)	Remarks
48	255	Depends on the setting of the DIP SW2-5.	Depends on the setting of the DIP SW2-5.	Beeps the internal buzzer.

DIP SW2-5: On = Repeats to beep for 640 ms and not to beep for 640 ms
Off = Beeps continuously

[Description]
- Beeps the internal buzzer when the specific offline factor occurs.
- *a* specifies the offline factor as follows:

a	Offline Factor
48	Paper roll near-end sensor detects the paper near end. (When the paper roll near-end sensor is disabled for stopping printing)

- *c* specifies the type of beeper.
  c = 0: Does not beep the internal buzzer.
  c = 255: Beeps the internal buzzer infinitely.
- *t1* specifies the period to beep to ($t1 \times 100$) ms.
  t1 = 255: Specifies infinite.
- *t2* specifies the period not to beep to ($t2 \times 100$) ms.
- Ends to beep the internal buzzer when either one of the following process is performed:
  a) Release the offline factor
  b) Pressing the FEED button (except the unrecoverable error)
    - After pressing the FEED button, the printer does not beep until the beep factor comes again after the previous factor is removed.
    - This function is enabled even if the panel buttons are disabled by **ESC c 5**.
  c) The offline factor which can be specified with <Function 98> occurs.
  d) *c* = 0 of this command (does not beep the internal buzzer) is performed when the factor to beep the internal buzzer occurs.

- The setting values of this command are continuously effective until either of the following conditions is executed.
  a) Resetting by this command.
  b) A command that causes a software reset is executed.
  c) Power off or hardware reset.
- The setting values of this command are not initialized with **ESC** @.
- If the printer receives Function 97 of this command during the beeping of the internal buzzer, the printer stops beeping the internal buzzer, and processes the Function 97. After processing it, the printer restarts beeping the internal buzzer again.

[Notes]
- The PAPER OUT LED does not turn on even if the paper end is detected when the parameters are set as follows:
  a = 48: Paper roll near-end sensor detects the paper near end.
  c = 0: Does not beep the internal buzzer.

[Reference] **ESC c 4**

ESC ∗ *m nL nH d1...dk*

[Name] Select bit-image mode

[Format]

ASCII	ESC	∗	*m*	*nL*	*nH*	*d1...dk*
Hex	1B	2A	*m*	*nL*	*nH*	*d1...dk*
Decimal	27	42	*m*	*nL*	*nH*	*d1...dk*

[Range] $m = 0, 1$
$0 \le n_L \le 255$
$0 \le n_H \le 3$
$0 \le d \le 255$

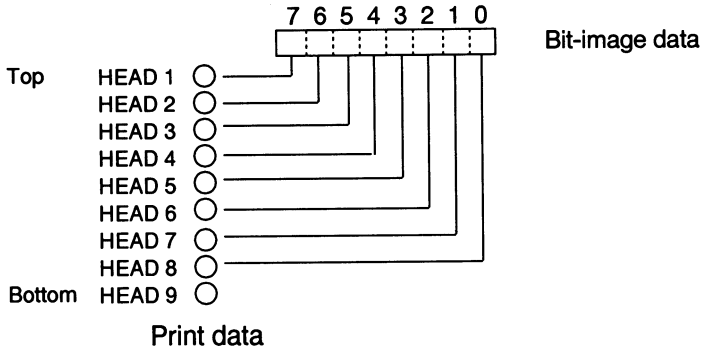
[Description] Selects a bit-image mode using *m* for the number of dots specified by *nL* and *nH*

- Divide the number of dots to be printed by 256. The interger answer is *nH* and the remainder is *nL*. Therefore, the number of dots in the horizontal direction is calculated by $n_L + 256 \times n_H$.
- If the bit-image data input exceeds the number of dots to be printed on a line, the excess data is ignored.
- *d* indicates the bit-image data. Setting a bit to 1 prints a dot or to 0 does not print a dot.
- The bit-image modes selectable by *m* are as follows.

		Horizontal direction		
m	No. of vertical dots	Dot density	Adjacent dot	Maximum number of dots
0	8	Single density	Permitted	200
1	8	Double density	Prohibited	400

[Details]
- If the values of *m and nH* are out of the specified range, the data following is processed as normal data.
- After printing a bit image, the printer returns to normal data processing mode.

- The relationship between the image data and the dots to be printed is as follows.



ESC – *n*

[Name] Turn underline mode on/off

[Format]

ASCII	ESC	–	*n*
Hex	1B	2D	*n*
Decimal	27	45	*n*

[Range] *n* = 0, 1, 48, 49

[Description] Turns underline mode on or off,

- When *n* = 0 or 48, underline mode is turned off.
- When *n* = 1 or 49, underline mode is turned on.

[Details]

- Underlines can be printed for all characters, but not for the space set by **HT**.
- This command and **ESC !** turn underline mode on or off in the same way.
- The underline setting by this command does not affect the Kanji character printing.

[Default] *n* = 0

[Reference] **ESC !**

ESC 2

[Name] Select default line spacing

[Format]

ASCII	ESC	2
Hex	1B	32
Decimal	27	50

[Description] Selects default (4.233 mm {1/6"}) line spacing.

[Reference] **ESC 3**

ESC 3 *n*

[Name] Set line spacing

[Format]

ASCII	ESC	3	*n*
Hex	1B	33	*n*
Decimal	27	51	*n*

[Range] $0 \leq n \leq 255$

[Description] Sets the line spacing to [$n \times 0.176$ mm {1/144"}].

[Default] $n = 24$

[Reference] **ESC 2**

ESC <

[Name] Return home

[Format]

ASCII	ESC	<
Hex	1B	3C
Decimal	27	60

[Description] Moves the print head to the standby position.

[Details]
- The print head first moves to the left-most position, then to the right-most position, and then to the left-most position again.
- The left-most end is detected by the home position sensor.
- Since the home position is detected when this command is executed, the printing position may shift after this command is executed.

ESC = *n*

[Name] Select device

[Format]

ASCII	ESC	=	*n*
Hex	1B	3D	*n*
Decimal	27	61	*n*

[Range] $1 \le n \le 3$

[Description] Selects the device to which host computer sends data, using *n* as follows:

Bit	Off/On	Hex	Decimal	Function
0	Off	00	0	Printer disabled.
	On	01	1	Printer enabled.
1	Off	00	0	Customer display disabled.
	On	02	2	Customer display enabled.
2	-	-	-	Undefined.
3	-	-	-	Undefined.
4	-	-	-	Undefined.
5	-	-	-	Undefined.
6	-	-	-	Undefined.
7	-	-	-	Undefined.

[Details]
- When the printer is disabled, it ignores all data except error-recovery commands (**DLE EOT** and **DLE ENQ**) until it is enabled by this command.

[Default] *n* = 1

[Reference] **DLE EOT**, **DLE ENQ**

ESC ? *n*

[Name] Cancel user-defined characters

[Format]

ASCII	ESC	?	*n*
Hex	1B	3F	*n*
Decimal	27	63	*n*

[Range] $32 \leq n \leq 126$

[Description] Cancels user-defined characters.

[Details]
- This command cancels the pattern defined for the character code specified by *n*. After the user-defined character is canceled, the corresponding pattern for the internal character is printed.
- This command deletes the defined pattern for the specified code in the character font selected by the "**ESC !**" command.
- If a user-defined character has not been defined for the specified character code, the printer ignores this command.

[Reference] **ESC &, ESC %**

ESC @

[Name] Initialize printer

[Format]

ASCII	ESC	@
Hex	1B	40
Decimal	27	64

[Description] Clears the data in the print buffer and resets the printer mode to the mode that was in effect when the power was turned on.

[Details]
- The DIP switch settings are not checked again.
- The data in the receive buffer is not cleared.

ESC D *n*1... *nk NUL*

[Name] Set horizontal tab positions

[Format]

ASCII	ESC	D	*n1...nk*	*NUL*
Hex	1B	44	*n1...nk*	*00*
Decimal	27	68	*n1...nk*	*0*

[Range] $1 \leq n \leq 255$

$0 \leq k \leq 32$

[Description] Sets horizontal tab positions.

- *n* specifies the column number (counted from the beginning of the line) for setting a horizontal tab position.
- *k* indicates the total number of horizontal tab positions to be set.

[Details]

- The tab position is set at [character width x *n*] from the beginning of the line. The character width includes the right-side space of the character, and is twice the normal value when double-width is specified.
- This command deletes horizontal tab positions that have already been set.
- When "*n* = 8" has been set for the horizontal tab position, the printing position moves to the ninth digit when **HT** is executed.
- Up to 32 tab positions can be set. Data exceeding 32 tab positions is processed as normal data.
- Input <*n*>k in ascending order and place a NUL code <00>H at the end. When <*n*>k is less than or equal to the preceding value <*n*>*k*-1, tab setting is finished and the following data is processed as normal data.
- **ESC D *NUL*** cancels all horizontal tab positions.
- The previously specified horizontal tab positions do not change, even if the character width changes.

[Default] The default tab positions are at intervals of 8 characters (columns 9, 17, 25, ...) for font B (7 × 9).

[Reference] **HT**

ESC E *n*

[Name] Turn emphasized mode on/off

[Format]

ASCII	ESC	E	*n*
Hex	1B	45	*n*
Decimal	27	69	*n*

[Range] $0 \le n \le 255$

[Description] Turns emphasized mode on or off.

- When the LSB of *n* is 0, emphasized mode is turned off.
- When the LSB of *n* is 1, emphasized mode is turned on.

[Details]
- Only the lowest bit of *n* is enabled.
- The printer does not emphasize bit-images.
- This command and **ESC !** turn emphasized mode on and off in the same way. The last received command becomes effective.
- Printer output is the same in double-strike (**ESC G**) and in emphasized.
- This command affects the alphanumeric and Kanji character printing.

[Notes]
- 2-pass printing is slower in emphasized mode.

[Default] *n* = 0

[Reference] **ESC !, ESC G**

ESC G *n*

[Name] Turn double-strike mode on/off

[Format]

ASCII	ESC	G	*n*
Hex	1B	47	*n*
Decimal	27	71	*n*

[Range] $0 \le n \le 255$

[Description] Turns double-strike mode on or off.

- When the LSB of *n* is 0, double-strike mode is turned off.
- When the LSB of *n* is 1, double-strike mode is turned on.

[Details]
- Only the lowest bit of *n* is enabled.

[Notes]
- The printer does not double-strike bit-images.
- Printer output is the same in double-strike and in emphasized (**ESC E**).
- This command affects the alphanumeric and Kanji character printing.
- 2-pass printing is slower in double-strike mode.

[Default] *n* = 0

[Reference] **ESC E**

ESC J *n*

[Name] Print and feed paper

[Format]

ASCII	ESC	J	*n*
Hex	1B	4A	*n*
Decimal	27	74	*n*

[Range] $0 \le n \le 255$

[Description] Prints the data in the print buffer and feeds the paper [$n \times 0.176$ mm {1/144"}].

[Details]
- After printing is completed, this command sets the print starting position to the beginning of the line.
- This command has no effect on the line feed amount set by the **ESC 2** command or the **ESC 3** command.

[Reference] **ESC K**

ESC K *n*

[Name] Print and reverse feed

[Format]

ASCII	ESC	K	*n*
Hex	1B	4B	*n*
Decimal	27	75	*n*

[Range] $0 \le n \le 48$

[Description] Prints the data in the print buffer and feeds the paper [$n \times 0.176$ mm {1/144"}] in the reverse direction

[Details]
- If *n* is out of the specified range, the printer prints the data and does not feed the paper.

[Notes]
- This command must not be issued continuously more than two times.
- Reverse direction paper feeding causes the following problems:
  1) Paper feed pitch is incorrect.
  2) Printer noise is louder than normal.
  3) The paper may rub against the ribbon and become dirty.

[Reference] **ESC J**

ESC R *n*

[Name] Select an international character set

[Format]

ASCII	ESC	R	*n*
Hex	1B	52	*n*
Decimal	27	82	*n*

[Range] $0 \le n \le 13$

[Description] Selects an international character set *n* from the following table:

n	Character set
0	U.S.A.
1	France
2	Germany
3	U.K.
4	Denmark I
5	Sweden
6	Italy
7	Spain I
8	Japan
9	Norway
10	Denmark II
11	Spain II
12	Latin America
13	Korea

[Default] *n* = 0

[Reference] Section 3.2.20, Character Code Tables.

ESC U *n*

[Name] Turn unidirectional printing mode on/off

[Format]

ASCII	ESC	U	*n*
Hex	1B	55	*n*
Decimal	27	85	*n*

[Range] $0 \le n \le 255$

[Description] Turns unidirectional printing mode on or off

When the LSB of *n* is 0, it turns off unidirectional printing mode and turns bidirectional printing mode on.)

When the LSB of *n* is 1, it turns on unidirectional printing mode and turns on bidirectional printing mode.

[Details]
- When unidirectional printing mode is turned on, the printer prints from left to right.
- To avoid horizontal printing misalignment, unidirectional printing mode should be used.

[Default] *n* = 0

ESC a *n*

[Name] Select justification

[Format]

ASCII	ESC	a	*n*
Hex	1B	61	*n*
Decimal	27	97	*n*

[Range] $0 \le n \le 2$, $48 \le n \le 50$

[Description] Aligns all the data in one line to the specified position.

n selects the type of justification as follows:

n	Justification
0, 48	Left justification
1,49	Centering
2, 50	Right justification

[Details]
- The command is enabled only when input at the beginning of the line.
- A portion of the data skipped by an **HT** is also target data for the justification function.

[Default] *n* = 0

[Example]

Left justification

```
ABC
ABCD
ABCDE
```

Centering

```
 ABC
ABCD
ABCDE
```

Right justification

```
  ABC
 ABCD
ABCDE
```

ESC c 3 *n*

[Name] Select paper detector(s) to output paper end signals

[Format]

ASCII	ESC	c	3	*n*
Hex	1B	63	33	*n*
Decimal	27	99	51	*n*

[Range] $0 \le n \le 255$

[Description] Selects the paper detector(s) to output paper end signals, using *n* as follows:

Bit	Off/On	Hex	Decimal	Function
0	Off	00	0	Paper roll near-end sensor disabled.
	On	01	1	Paper roll near-end sensor enabled.
1	Off	00	0	Paper roll near-end sensor disabled.
	On	02	2	Paper roll near-end sensor enabled.
2	Off	00	0	Paper roll end detector disabled.
	On	04	4	Paper roll end detector enabled.
3	Off	00	0	Paper roll end detector disabled.
	On	08	8	Paper roll end detector enabled.
4	-	-	-	Undefined
5	-	-	-	Undefined
6	-	-	-	Undefined
7	-	-	-	Undefined

[Details]
- It is possible to select multiple detectors to output signals. Then, if any of the detectors detect a paper end, the paper end signal is output.
- This command is ignored in the serial interface model.
- The timing to detect the state of the sensor that is selected may differ in each model.

[Default] *n* = 15

ESC c 4 *n*

[Name] Select paper sensor(s) to stop printing

[Format]

ASCll	ESC	c	4	*n*
Hex	18	63	34	*n*
Decimal	27	99	52	*n*

[Range] $0 \le n \le 255$

[Description] Selects the paper sensor(s) to use to stop printing when a paper-end is detected, using *n* as follows :

Bit	Off/On	Hex	Decimal	Function
0	Off	00	0	Paper roll near-end sensor disabled.
	On	01	1	Paper roll near-end sensor enabled.
1	Off	00	0	Paper roll near-end sensor disabled.
	On	02	2	Paper roll near-end sensor enabled.
2	-	-	-	Undefined.
3	-	-	-	Undefined.
4	-	-	-	Undefined.
5	-	-	-	Undefined.
6	-	-	-	Undefined.
7	-	-	-	Undefined.

[Details]
- When a paper end is detected, printing stops after printing the current line and feeding the paper.
- The printer goes offline after printing stops.
- The paper roll near-end sensor is enabled when either bit 0 or 1 is 1.
- The paper roll end sensor always stops printing.

[Default] *n* = 0

ESC c 5 *n*

[Name] Enable/disable panel buttons

[Format]

ASCII	ESC	c	5	*n*
Hex	1B	63	35	*n*
Decimal	27	99	53	*n*

[Range] $0 \le n \le 255$

[Description] Enables or disables the panel buttons.

- When the LSB of *n* is 0, the panel buttons are enabled.
- When the LSB of *n* is 1, the panel buttons are disabled.

[Details]

- Only the least significant bit of *n* is valid.
- When the panel buttons are disabled, no buttons on the panel are usable. However, when loading roll paper, if the paper loading wait time has been set with **GS z 0**, or when the cover is opened, the panel buttons are always effective regardless of the setting by this command. Also, the lighting function of the LEDs work regardless of the setting by this command.

[Default] *n* = 0

ESC d *n*

[Name] Print and feed *n* lines

[Format]

ASCII	ESC	d	*n*
Hex	1B	64	*n*
Decimal	27	100	*n*

[Range] $0 \le n \le 255$

[Description] Prints the data in the print buffer and feeds *n* lines.

[Details]

- This command sets the print starting position to the beginning of the line.
- The maximum paper feed amount is 1016 mm {40"}. If the specified amount exceeds 1016 mm {40"}, the paper feed amount is automatically set to 1016 mm {40"}.
- This command has no effect on the line feed amount set by the **ESC 2** command or the **ESC 3** command.

[Reference] **ESC e**

ESC e *n*

[Name] Print and reverse feed *n* lines

[Format]

ASCII	ESC	e	*n*
Hex	1B	65	*n*
Decimal	27	101	*n*

[Range] $0 \le n \le 2$

[Description] Prints the data in the print buffer and feeds *n* lines in the reverse direction.

[Details]
- If *n* is out of the specified range (if the paper feed amount exceeds 8.467 mm {48/144"}), the printer prints the data and does not feed the paper.

[Notes]
- This command must not be issued continuously more than two times.
- Reverse direction paper feeding causes the following problems:
  1) Paper feed pitch is incorrect.
  2) Printer noise is louder than normal.
  3) The paper may rub against the ribbon and become dirty.

[Reference] **ESC d**

ESC p *m t1 t2*

[Name] Generate pulse

[Format]

ASCII	ESC	p	*m*	*t1*	*t2*
Hex	1B	70	*m*	*t1*	*t2*
Decimal	27	112	*m*	*t1*	*t2*

[Range] $0 \le m \le 1$, $48 \le m \le 49$
$0 \le t1 \le 255$
$0 \le t2 \le 255$

[Description] Outputs the pulse specified by *t1* and *t2* to connector pin *m* as follows:

m	Connector pin
0, 48	Drawer kick-out connector pin 2
1, 49	Drawer kick-out connector pin 5

[Details]
- The pulse ON time is [$t1 \times 2$] ms and the OFF time is [$t2 \times 2$] ms.
- When $t2 < t1$, the printer processes $t1 \times 2$ ms.
- If *t1* is less than 50, *t1* is assumed to be equal to 50.
- If *t2* is less than 50, *t2* is assumed to be equal to 50.

ESC r *n*

[Name] Select print color

[Format]

ASCII	ESC	r	*n*
Hex	1B	72	*n*
Decimal	27	114	*n*

[Range] *n* = 0, 1, 48, 49

[Description] Selects the print color.

n	Selected color
0, 48	Black
1, 49	Red

[Details] • Valid only when input at the beginning of a line.

[Default] *n* = 0

ESC t *n*

[Name] Select character code table

[Format]

ASCII	ESC	t	*n*
Hex	1B	74	*n*
Decimal	27	116	*n*

[Range] $0 \le n \le 8$, $n = 16$, $20 \le n \le 26$, $n = 254, 255$

[Description] Selects a page *n* from the character code table.

n	Selected Character Code
0	PC437 (U.S.A., Standard Europe)
1	Katakana
2	PC850 (Multilingual)
3	PC860 (Portuguese)
4	PC863 (Canadian-French)
5	PC865 (Nordic)
6	Hiragana
7	One-pass printing Kanji characters
8	One-pass printing Kanji characters
16	WPC1252
20	Thai character code 42
21	Thai character code 11
22	Thai character code 13
23	Thai character code 14
24	Thai character code 16
25	Thai character code 17
26	Thai character code 18
254	Space
255	Space

[Default] *n* = 0, For Thai characters model: *n* = 2

[Reference] Section 3.2, Character Code Tables

ESC { *n*

[Name] Turns on/off upside-down printing mode

[Format]

ASCII	ESC	{	*n*
Hex	1B	7B	*n*
Decimal	27	123	*n*

[Range] $0 \le n \le 255$

[Description] Turns upside-down printing mode on or off.

- When the LSB of *n* is 0, upside-down printing mode is turned off.
- When the LSB of *n* is 1, upside-down printing mode is turned on.

[Details]

- Only the lowest bit of *n* is effective.
- This command is enabled only when input at the beginning of a line.
- In upside-down printing mode, the printer rotates the line to be printed by 180° and then prints it.

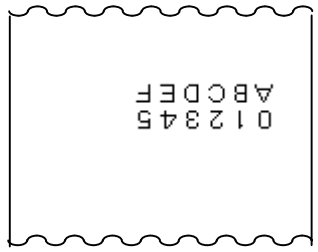
[Default] *n* = 0

[Example]

When upside-down printing mode is turned off

ABCDEF
012345

When upside-down printing mode is turned on



Paper feed direction

GS (A *pL pH n m*

[Name] Execute test print

[Format]

ASCII	GS	(	A	*pL*	*pH*	*n*	*m*
Hex	1D	28	41	*pL*	*pH*	*n*	*m*
Decimal	29	40	65	*pL*	*pH*	*n*	*m*

[Range] $(p_L+(p_H\times256))=2$ ($p_L=2$, $p_H=0$)
$0 \le n \le 2$, $48 \le n \le 50$
$1 \le m \le 3$, $49 \le m \le 51$

[Description]
- Executes a test print with a specified test pattern on the specified paper.
- *pL* and *pH* specifies the number of the parameter such as *n*, *m* as ($p_L + (p_H \times 256)$) bytes.

n specifies the paper to be tested.

n	Paper
0, 48	Basic (paper roll)
1, 49 2, 50	Paper roll

m specifies a test pattern.

m	Test pattern
1, 49	Hexadecimal dump
2, 50	Printer status print
3, 51	Rolling pattern print

[Details]
- This command is enabled only when processed at the beginning of a line in standard mode.
- After the test print is finished, the printer resets itself automatically. Therefore, the already-defined data before this command is executed, such as user-defined characters, downloaded bit image, and macro, becomes undefined, and the receive buffer and print buffer are cleared, and each setting returns to the default value. The printer also re-reads the DIP switch settings.
- At the end of the test print, the printer cuts the paper.
- The printer goes BUSY while this command is executed.

[Notes]
- When a hexadecimal dump is printed by this command, the data transmitted after the command may not be printed, because the printer clears the receive buffer. To avoid this, transmit data from the host after the printer prints the starting message of the hexadecimal dump.

GS I *n*

[Name] Transmit printer ID

[Format]

ASCII	GS	I	*n*
Hex	1D	49	*n*
Decimal	29	73	*n*

[Range] $1 \le n \le 3$, $49 \le n \le 51$, $65 \le n \le 69$

[Function] Transmits the printer ID specified by *n* as follows:

n	Printer ID	ID (hexadecimal)
1, 49	Printer model ID	2A
2, 50	Type ID	See table below.
3, 51	ROM version ID	ROM version

n	Printer Information Type	Information
65	Firmware version	Depends on firmware version.
66	Manufacturer	EPSON
67	Printer name	TM - U230
68	Serial number	Depends on serial number.
69	Supporting multilingual	Japanese Kanji model: KANJI JAPANESE Chinese Kanji model: CHINA GB2312 Taiwanese Kanji model: TAIWAN BIG-5 Korean Kanji model: KOREA C-5601C Thai characters model: THAI 3 PASS

n = 2, Type ID

Bit	Off/On	Hex	Decimal	Function
0	Off	00	0	Two-byte code character not supported.
	On	01	1	Two-byte code character supported.
1	On	02	2	Autocutter installed.
2	-	-	-	Undefined.
3	-	-	-	Undefined.
4	Off	00	0	Not used. Fixed to Off.
5	-	-	-	Undefined.
6	-	-	-	Undefined.
7	Off	00	0	Not used. Fixed to Off.

[Details]

- When the printer ID transmission is specified by one-byte data, the following contents are transmitted:

  Header: Hexadecimal = 5FH / Decimal = 95 (1 byte)
  Data: Printer information
  NUL: Hexadecimal = 00H / Decimal = 0 (1 byte)

- When DTR/DSR control is selected, the printer transmits only 1 byte (printer ID) after confirming that the host is ready to receive data. If the host computer is not ready to receive data, the printer waits until the host is ready.
- When XON/XOFF control is selected, the printer transmits only 1 byte (printer ID) without confirming the condition whether the host is ready to receive data or not.
- The printer ID is transmitted when the data in the receive buffer is developed. Therefore, there may be a time lag between receiving this command and transmitting the status, depending on the receive buffer status.
- When Auto Status Back (ASB) is enabled using **GS a**, the status transmitted by **GS I** and the ASB status must be differentiated by using the table in Appendix E.
- After the data is ready to be transmitted, the printer executes the following process.
  ① Changes READY to BUSY. If it is already BUSY, the printer changes nothing.
  ② Transmits [Header + Data + NUL].
  ③ Executes BUSY to READY. If it is already BUSY from any other cause, the printer changes nothing.

[Reference] Appendix E

① GS V *m*
②, ③ GS V *m n*

[Name] Select cut mode and cut paper

[Format] ①

ASCII	GS	V	*m*	
Hex	1D	56	*m*	
Decimal	29	86	*m*	

[Format] ②, ③

ASCII	GS	V	*m*	*n*
Hex	1D	56	*m*	*n*
Decimal	29	86	*m*	*n*

[Range] ① $m = 1, 49$
② $m = 66, \quad 0 \le n \le 255$
③ $m = 98, \quad 0 \le n \le 255$

[Default] None

[Description for ①]

- Cuts the paper according to *m.*

m	Function
1, 49	Partial cut (one point left uncut)

[Description for ②]

- Feeds the paper, then cuts the paper according to *m*.

m	Function
66	Feeds paper (cutting position + [$n \times 0.176$ mm {*n*/144"}], and cuts the paper paritially (one point left uncut).

[Description for ③]

- Selects the paper cutting area for (basic amount (approximately 4 mm {0.16"}) + [$n \times 0.176$ mm {*n*/144"}]) based on the current position.
- Feeds the paper for a total amount that is the same as the area above; then the printer processes data normally.
- When the cutting position specified reaches the autocutter position, the printer cuts the paper according to *m*.

m	Function
98	Partial cut (one point left uncut)

[Details]
- This command is effective only at the beginning of a line.

[Details for ①]
- This command does not feed the paper.

[Details for ②]
- When $n = 0$, the printer feeds the paper to the cutting position.
- When $n \neq 0$, the printer feeds the paper to (cutting position + [$n \times 0.176$ mm {*n*/144"}], then cuts the paper.

[Details for ③]

- If a top margin that exceeds 27 mm {1.06"} for the cutting range is specified by *n*, the printer sets the cutting range as equal to the top margin (the distance between the autocutter and the print head).
- The cutting range can be set for multiple paper types.
- Cutting paper is executed once for one cutting range. The cutting position can be performed if it is within the cutting range.
- All setting values for the paper cutting range are abandoned if any of the following cases is performed.
  ① Execution of **ESC @**
  ② Command execution that resets the software
  ③ Power off or hardware reset
  ④ Pressing the FEED button

[Reference] **ESC @**

GS a *n*

[Name] Enable/Disable Automatic Status Back

[Format]

ASCII	GS	a	*n*
Hex	1D	61	*n*
Decimal	29	97	*n*

[Range] $0 \le n \le 255$

[Description] Enables or disables ASB and specifies the status items to include, using *n* as follows:

Bit	Off/On	Hex	Decimal	Status for ASB
0	Off	00	0	Drawer kick-out connector pin 3 status disabled.
	On	01	1	Drawer kick-out connector pin 3 status enabled.
1	Off	00	0	Online/offline disabled.
	On	02	2	Online/offline enabled
2	Off	00	0	Error status disabled.
	On	04	4	Error status enabled.
3	Off	00	0	Paper roll sensor status disabled.
	On	08	8	Paper roll sensor status enabled.
4	-	-	-	Undefined.
5	-	-	-	Undefined.
6	-	-	-	Undefined.
7	-	-	-	Undefined.

[Details]

- Even if only one of the status items is enabled, the status is sent when this command is executed. Subsequently, whenever the state of a valid status changes, that status is sent. In this case, because the current state is shown for each status, there is a possibility of a state change for a status for which ASB is not enabled.
- If all status items are disabled, the Automatic Status Back (ASB) function is disabled.
- When transmitting a status item, the printer transmits only four bytes without confirming the condition of the DSR signal.
- The four bytes of status data must be consecutive, except for the XOFF code.
- This command is executed when the data in the receive buffer is developed. Therefore, there may be a time lag between receiving this command and transmitting the status, depending on the receive buffer status.
- When the printer is disabled by **ESC =** (Select peripheral device), this command is disabled but ASB is not disabled.
- When using **DLE EOT, GS I,** or **GS r**, the status transmitted by this command, the ASB information, and the status transmitted by other commands must be differentiated by using the table in Appendix E.
- The status is transmitted with the four bytes without confirming whether the host is ready to receive or not, as follows. The four-byte status must be sent in a series except for the XOFF code.
- With the Ethernet interface model, **GS a 255** is sent first when the power of the printer is turned on. Because of this, all printer status are effective at initializing, regardless of the DIP switch setting.

First byte (printer information)

Bit	Off/On	Hex	Decimal	Status for ASB
0	Off	00	0	Not used. Fixed to Off.
1	Off	00	0	Not used. Fixed to Off.
2	Off	00	0	Drawer kick-out connector pin 3 is LOW
	On	04	4	Drawer kick-out connector pin 3 is HIGH.
3	Off	00	0	Online.
	On	08	8	Offline.
4	On	10	16	Not used. Fixed to On.
5	Off	00	0	The cover is opened.
	On	20	32	The cover is closed.
6	Off	00	0	Paper is not being fed by the paper FEED button.
	On	40	64	Paper is being fed by the paper FEED button.
7	Off	00	0	Not used. Fixed to Off.

Second byte (printer information)

Bit	Off/On	Hex	Decimal	Status for ASB
0	Off	00	0	Not waiting for online recovery.
	On	01	1	Waiting for online recovery.
1	-	-	-	Undefined.
2	Off	00	0	No mechanical error.
	On	04	4	Mechanical error.
3	Off	00	0	No autocutter error.
	On	08	8	Autocutter error occurred.
4	Off	00	0	Not used. Fixed to Off.
5	Off	00	0	No unrecoverable error.
	On	20	32	Unrecoverable error.
6	Off	00	0	No recoverable error.
	On	40	64	Recoverable error.
7	Off	00	0	Not used. Fixed to Off.

Third byte (paper sensor information)

Bit	Off/On	Hex	Decimal	Status for ASB
0,1	Off	00	0	Paper near-end sensor: paper adequate.
	On	03	3	Paper near-end sensor: paper near end.
2,3	Off	00	0	Paper end sensor: paper present.
	On	0C	12	Paper end sensor: no paper present.
4	Off	00	0	Not used. Fixed to Off.
5	-	-	-	Undefined.
6	-	-	-	Undefined.
7	Off	00	0	Not used. Fixed to Off.

Fourth byte (paper sensor information)

Bit	Off/On	Hex	Decimal	Status for ASB
0	-	-	-	Undefined.
1	-	-	-	Undefined.
2	-	-	-	Undefined.
3	-	-	-	Undefined.
4	Off	00	0	Not used. Fixed to Off.
5	-	-	-	Undefined.
6	-	-	-	Undefined.
7	Off	00	0	Not used. Fixed to Off.

[Default] When DIP SW 1-8 is off: *n* = 0
When DIP SW 1-8 is on: *n* = 2
When the Ethernet interface model is used: *n* = 255

[Reference] **DLE EOT, GS r**, 3.5.1, Error types, Appendix E

GS r *n*

[Name] Transmit status

[Format]

ASCII	GS	r	*n*
Hex	1D	72	*n*
Decimal	29	114	*n*

[Range] $1 \le n \le 2$, $49 \le n \le 50$

[Description] Transmits the status specified by *n* as, follows:

n	Function
1, 49	Transmits paper sensor status
2, 50	Transmits drawer kick-out connector status

[Details]

- When DTR/DSR control is selected, the printer transmits only 1 byte after confirming the host is ready to receive data. If the host computer is not ready to receive data, the printer waits until the host is ready.
- When XON/XOFF control is selected, the printer transmits only 1 byte without confirming whether the printer is ready to receive data or not.
- This command is executed when the data in the receive buffer is developed. Therefore, there may be a time lag between receiving this command and transmitting the status, depending on the receive buffer status.
- When Auto Status Back (ASB) is enabled using **GS a**, the status transmitted by **GS r** and the ASB status must be differentiated by using the table in Appendix E.
- The status types to be transmitted are shown below:

Paper sensor status (*n* = 1,49)

Bit	Off/On	Hex	Decimal	Status for ASB
0,1	Off	00	0	Paper near-end sensor: paper adequate.
	On	03	3	Paper near-end sensor: paper near end.
2,3	Off	00	0	Paper end sensor: paper present.
	On	0C	12	Paper end sensor: no paper present.
4	Off	00	0	Not used. Fixed to Off.
5	-	-	-	Undefined.
6	-	-	-	Undefined.
7	Off	00	0	Not used. Fixed to Off.

Drawer kick-out connector status (*n* = 2, 50):

Bit	Off/On	Hex	Decimal	Status for ASB
0	Off	00	0	Drawer kick-out connector pin 3 is LOW.
	On	01	1	Drawer kick-out connector pin 3 is HIGH.
1	-	-	-	Undefined.
2	-	-	-	Undefined.
3	-	-	-	Undefined.
4	Off	00	0	Not used. Fixed to Off.
5	-	-	-	Undefined.
6	-	-	-	Undefined.
7	Off	00	0	Not used. Fixed to Off.

[Reference] **DLE EOT, GS a,** Appendix E

GS z 0 *t1 t2*

[Name] Setting of online recovery wait time

[Format]

ASCII	GS	z	0	*t1*	*t2*
Hex	1D	7A	30	*t1*	*t2*
Decimal	29	122	48	*t1*	*t2*

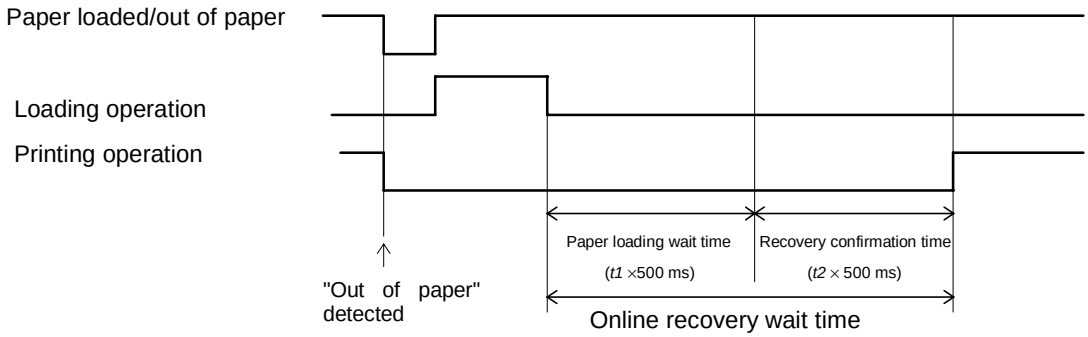
[Range] $0 \le t1 \le 255$
$0 \le t2 \le 255$

[Function] Sets the paper loading wait time (from paper insertion to the recovery confirmation state) to approximately (*t1* × 500 ms) and the recovery confirmation time (from the end of the paper loading wait time to online recovery) to approximately (*t2* × 500 ms).

- When *t1* = 0, the printer enters the recovery confirmation state as soon as the paper is inserted.
- When *t2* = 0, the recovery confirmation time is canceled.

[Details]

- When the printer has gone offline because printing stopped due to a lack of paper, it re-enters online operation once the set time elapses after paper loading is completed.



- Approximately (*t1* × 500 ms) after the paper is inserted and loaded, the printer enters the recovery confirmation state. This interval is the paper loading wait time. In the paper loading wait state, pressing the paper FEED button feeds the paper forward. In addition, in the paper loading wait state, recovery to the online status is possible only by executing **DLE ENQ 0**. After the paper loading wait time elapses, the printer enters the recovery confirmation state.
- If the paper is fed forward by pressing the paper FEED button during the paper loading wait time. The time during which the paper is being fed is not counted as part of the paper loading wait time.

- Approximately (*t2* × 500 ms) after the end of the paper loading wait time, the printer enters the online state. This interval is the recovery confirmation time. While the printer is in the recovery confirmation state, the PAPER OUT LED flashes. In the recovery confirmation state, it is possible to re-enter the online state by executing **DLE ENQ 0**, by allowing the recovery confirmation time to elapse, or by pressing the paper FEED button.
- The paper FEED button cannot be used to feed the paper forward during the recovery confirmation time.
- When *t2* = 0 and the PAPER OUT LED is flashing, re-entering the online state is possible by executing **DLE ENQ 0** or by pressing the paper FEED button.
- If the roll paper near-end sensor is mounted, and "printing stop" is enabled for the roll paper "near end" sensor by the **ESC c 4** command, the printer begins waiting for paper to be loaded once the roll paper near-end sensor and the roll paper detector both detect paper.
- If the roll paper detector detects the "out of paper" state while the printer is waiting for online recovery, the printer re-enters the roll paper insertion wait state.

[Default] *t1* = 6, *t2* = 0

[Reference] **DLE EOT**, **DLE ENQ**, **GS a**

FS ! *n*

[Name] Set print mode(s) for Kanji characters

[Format]

ASCII	FS	!	*n*
Hex	1C	21	*n*
Decimal	28	33	*n*

[Range] $0 \le n \le 255$

[Description] Sets the print mode for Kanji characters, using *n* as follows:

Bit	Off/On	Hex	Decimal	Status for ASB
0	-	-	-	Undefined.
1	-	-	-	Undefined.
2	Off	00	0	Double width mode disabled.
	On	04	4	Double width mode enabled.
3	Off	00	0	Double height mode disabled.
	On	08	8	Double height mode enabled.
4	-	-	-	Undefined.
5	-	-	-	Undefined.
6	-	-	-	Undefined.
7	Off	00	0	Underline mode disabled.
	On	80	128	Underline mode enabled.

[Details]

- This command is valid only for the Japanese Kanji model, Chinese Kanji model, and Taiwanese Kanji model, and Korean Kanji model.
- When both double-width and double-height modes are set (including right- and left-side character spacing), quadruple-size characters are printed.
- The printer can underline all characters (including right- and left-side character spacing), but cannot underline the space set by **HT**.

[Default] *n* = 0

[Reference] **FS –, FS W**

FS &

[Name] Select Kanji character mode

[Format]

ASCII	FS	&
Hex	1C	26
Decimal	28	38

[Description] Selects Kanji character mode.

[Details] For Japanese Kanji supporting model:

- This command is effective only when the JIS code system is selected.
- When Kanji character mode is selected, the printer processes each two-byte sequence as a Kanji character code.
- Kanji codes are processed in the order of the first byte and second byte.
- Kanji character mode is not selected when the power is turned on.
- Using **FS C**, the Kanji character code system is selected.

For Chinese/Taiwanese/Korean Kanji supporting model:

- When kanji character mode is selected, the printer checks whether the code is Kanji or not, then processes the first byte and the second byte, if the code is Kanji.
- Kanji codes are processed in the order of the first byte and second byte.
- Kanji character mode is selected when the power is turned on.

[Reference] **FS ., FS C**

FS – *n*

[Name] Turn underline mode on/off for Kanji characters

[Format]

ASCII	FS	–	*n*
Hex	1C	2D	*n*
Decimal	28	45	*n*

[Range] $0 \le n \le 1, 48 \le n \le 49$

[Description] Turns underline mode for Kanji characters on or off, based on the following values of *n*:

n	Function
0, 48	Turns off underline mode for Kanji characters
1, 49	Turns on underline mode for Kanji characters (1-dot thick)

[Details]

- This command is valid only for the Japanese Kanji model, Chinese Kanji model, and Taiwanese Kanji model, and Korean Kanji model.
- The printer can underline all characters (including right- and left-side character spacing), but cannot underline the space set by **HT**.

[Default] *n* = 0

[Reference] **FS !**

FS .

[Name] Cancel Kanji character mode

[Format]

ASCII	FS	.
Hex	1C	2E
Decimal	28	46

[Description] Cancels Kanji character mode.

[Details] For Japanese Kanji supporting model:

- This command is effective only when the JIS code system is selected.
- When Kanji character mode is not selected, all character codes are processed one byte at a time as ASCII code.
- Kanji character mode is not selected when the power is turned on.

For Chinese/Taiwanese/Korean Kanji supporting model:

- When Kanji character mode is not selected, all character codes are processed one byte at a time as ASCII code.
- Kanji character mode is selected when the power is turned on.

[Reference] **FS &, FS C**

FS 2 *c1 c2 d1...dk*

[Name] Define user-defined Kanji characters

[Format]

ASCII	FS	2	*c1*	*c2*	*d1...dk*
Hex	1C	32	*c1*	*c2*	*d1...dk*
Decimal	28	50	*c1*	*c2*	*d1...dk*

[Range] *c1* and *c2* indicate character codes for the defined characters. The range of values for *c1* and *c2* differ depending on the character code system used.

Model type	*c1*	*c2*
Japanese Kanji model (JIS code system)	*c1* = 77H	21H ≤ *c2* ≤ 7EH
Japanese Kanji model (SHIFT-JIS code system)	*c1* = ECH	40H ≤ *c2* ≤ 7EH 80H ≤ *c2* ≤ 9EH
Chinese Kanji model	*c1* = FEH	A1H ≤ *c2* ≤ FEH
Taiwanese Kanji model	*c1* = FEH	A1H ≤ *c2* ≤ FEH
Korean Kanji model	*c1* = FEH	A1H ≤ *c2* ≤ FEH

$0 \le d \le 255$
$k = 32$

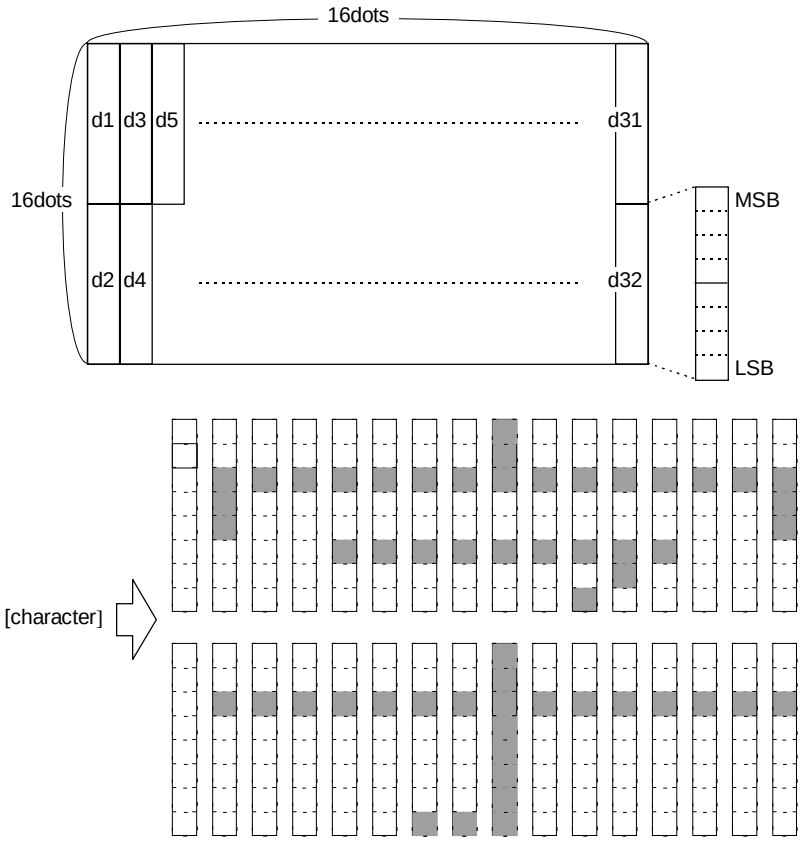
[Description]
- Defines user-defined Kanji characters for the character codes specified by *c1* and *c2*.

[Details]
- This command is valid only for the Japanese Kanji model, Chinese Kanji model, and Taiwanese Kanji model, and Korean Kanji model.
- *c1* and *c2* indicate character codes for the defined characters. The range of values for *c1* and *c2* differ depending on the character code system used.
- The *d* is the dot data for the characters. The amount of data defined by *d* is 32 bytes, which consists of 2 bytes for vertically × 16 dots.
- When the user-defined characters are defined, it is possible to redefine the defined Kanji character codes but not to define new Kanji character codes.
- An example of the dot data for characters is shown below.
- After user-defined characters are defined, they are available until; another definition is made; **ESC @, FS ?** is executed; the printer is reset; or the power is turned off.

[Default] All spaces.

[Reference] **FS ?, FS C**

<Example>



The dot pattern for the JIS code <7721>H is defined as shown above.

	FS	2	c1	c2	d1	d2	d3	d4	d5	d6	d7	d8	d9	d10	d11	d12
Code (Hex)	IC	32	77	21	00	00	38	20	20	20	20	20	24	20	24	20

d13	d14	d15	d16	d17	d18	d19	d20	d21	d22	d23	d24	d25	d26	d27	d28	d29
24	21	24	21	E4	FF	24	20	25	20	26	20	24	20	20	20	20

d30	d31	d32
20	38	20

The corresponding bit is 1 when printing and 0 when not printing.

FS ? *c1 c2*

[Name] Chancel user-defined Kanji characters

[Format]

ASCII	FS	?	*c1*	*c2*
Hex	1C	3F	*c1*	*c2*
Decimal	28	63	*c1*	*c2*

[Range] *c1* and *c2* indicate character codes for the defined characters. The range of values for *c1* and *c2* differ depending on the character code system used.

Model type	*c1*	*c2*
Japanese Kanji model (JIS code system)	*c1* = 77H	21H ≤ *c2* ≤ 7EH
Japanese Kanji model (SHIFT-JIS code system)	*c1* = ECH	40H ≤ *c2* ≤ 7EH 80H ≤ *c2* ≤ 9EH
Chinese Kanji model	*c1* = FEH	A1H ≤ *c2* ≤ FEH
Taiwanese Kanji model	*c1* = FEH	A1H ≤ *c2* ≤ FEH
Korean Kanji model	*c1* = FEH	A1H ≤ *c2* ≤ FEH

[Description] Cancels user-defined characters.

[Details]
- This command cancels the pattern defined for the Kanji character code specified by *c1* and *c2*. After the user-defined Kanji characters is canceled, the space character is printed.
- If a user-defined Kanji character has not been defined for the specified character code, the printer ignores this command.

[Notes]
- This command is valid only when the receive buffer capacity is 40 bytes (when DIP switch 1-2 is on).

[Reference] **FS 2, FS C**

FS C *n*

[Name] Select Kanji character code system

[Format]

ASCII	FS	C	*n*
Hex	1C	43	*n*
Decimal	28	67	*n*

[Range] *n* = 0, 1

[Description] Selects a Kanji character code system, based on the following values of *n*:

n	Kanji System
0	JIS code
1	SHIFT JIS code

[Details]
- This command is effective only for the Japanese Kanji supporting model.
- In the JIS code system, the following codes are available:
  Primary byte: <21>H to <7E>H
  Secondary byte: <21>H to <7E>H
- In the SHIFT JIS code system, the following codes are available:
  Primary byte: <81>H to <9F>H and <E0>H to <EF>H
  Secondary byte: <40>H to <7E>H and <80>H to <FC>H

[Default] *n* = 0

FS S *n1 n2*

[Name] Set left- and right-side Kanji character spacing

[Format]

ASCII	FS	S	*n1*	*n2*
Hex	1C	53	*n1*	*n2*
Decimal	28	83	*n1*	*n2*

[Range] $0 \le n1 \le 32$
$0 \le n2 \le 32$

[Description] Sets left- and right-side Kanji character spacing *n1* and *n2*, respectively.

[Details]
- This command is valid only for the Japanese Kanji model, Chinese Kanji model, Taiwanese Kanji model, and Korean Kanji model.
- When double-width mode is set, the left- and right-side character spacing is twice the normal value.
- The Kanji character spacing is set in half-dot units.

[Default] *n1* = 0, *n2* = 2

FS W *n*

[Name] Turn quadruple-size mode on/off for Kanji characters

[Format]

ASCII	FS	W	*n*
Hex	1C	57	*n*
Decimal	28	87	*n*

[Range] $0 \le n \le 255$

[Description] Turns quadruple-size mode on or off for Kanji characters.

- When LSB of *n* is 0, quadruple-size mode for Kanji characters is turned off.
- When LSB of *n* is 1, quadruple-size mode for Kanji characters is turned on.

[Details]

- This command is valid only for the Japanese Kanji model, Chinese Kanji model, Taiwanese Kanji model, and Korean Kanji model.
- Only the lowest bit of *n* is valid.
- In quadruple-size mode, the printer prints the same size characters as when double-width and double-height modes are both turned on.

[Default] *n* = 0

[Reference] **FS !**

APPENDIX A: MISCELLANEOUS NOTES

1) Print duty

- When printing exceeds the allowable print duty cycle, the printer automatically detects the print head temperature rise, stops logic-seeking, and enters full-column print head movement operation. This stops the temperature rise by lowering print duty. If the print head temperature continues to rise, the printer stops the print head. In this case, the user should be aware that the printing speed may slow significantly.
- When printing is stopped due to high print head temperature, the ERROR LED blinks as shown in Table 3.5.1.
- When the head temperature error occurs, the printer goes offline. The printer automatically goes back online when the print head temperature falls.
- The upper limit conditions on continuous printing are as follows. (An example test pattern is shown in Figure A-1 and Figure A-2.)

[Conditions]

- Maximum continuous printing time: 1 hour
- Ambient temperature: 25°C {77°F}
- Number of line feeds:

  Set the number of lines to be fed based on the following ratio:

  A: ratio between printed lines and fed lines

$$A \leq \frac{\text{15 lines of printing}}{\text{10 additional blank lines fed}}$$

- Print head duty:

  The number of print columns must be 20 or less in full-column print head movement operation.

- Print color selection:

  Do not switch the print color frequently. When a black-red-black or red-black-red color selection sequence is regarded as 1 switching, the user should perform switching according to the rate shown below.

  B: Print color switching rate

$$B \leq \frac{\text{2 switches}}{\text{15 lines of printing}}$$

2) Data transmission

Data should be transmitted after the printer power is turned on and initialization finishes.

3) Reverse paper feed

Normally, the printer can feed paper 1 line (including the gear backlash) in the reverse direction, when **ESC K** or **ESC e** is executed. However, do not reverse feed more than 8.467 mm {48/144"} (including the gear backlash).

4) Paper cut position

The distance between the paper cut postion of the autocutter and the paper cut position of the cutter on the cover is 27 mm {1.06"}.

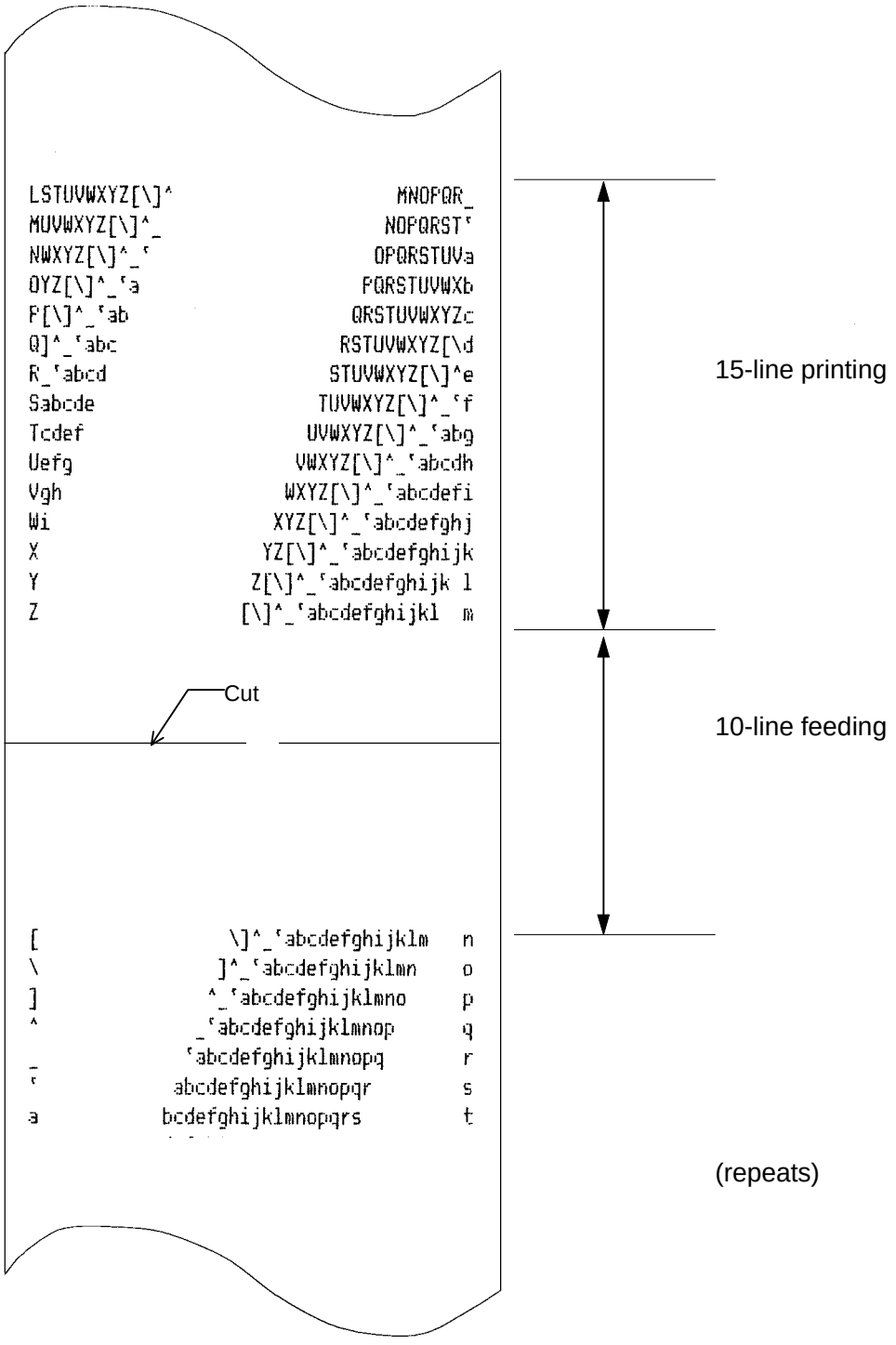


Figure A-1 Continuous Printing Test Pattern (Using the ERC-38(P)/(B))

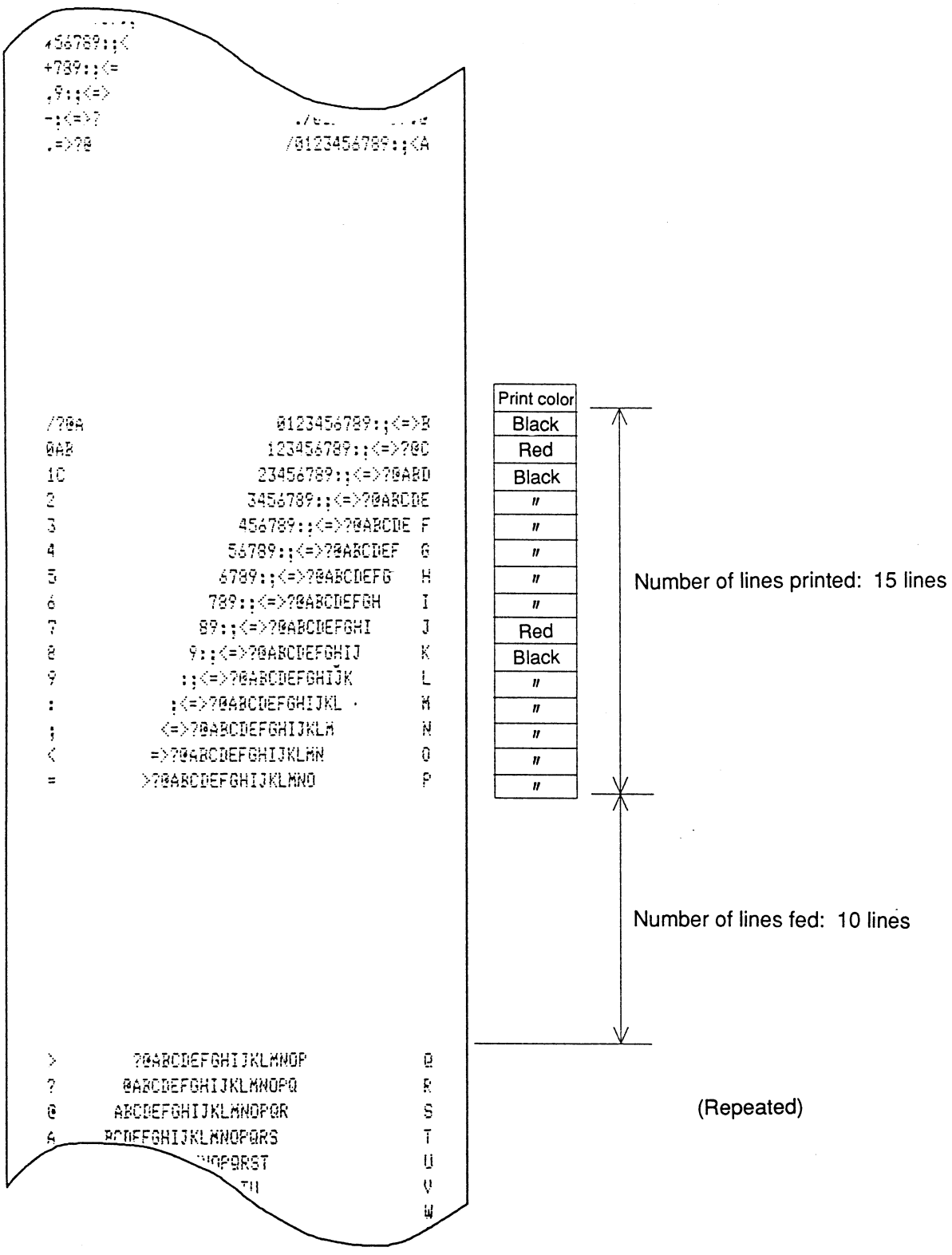


Figure A-2 Continuous Printing Test Pattern (Using the ERC-38(B/R))

4) Manual operation of the autocutter

In a paper jam, the printer may be stopped with the autocutter blade not in its normal position. In such cases, insert the screwdriver into the hole at the right side of the autocutter, as shown in Figure A-3, and turn the gear inside the cutter unit to move the cutter blade to its normal position.

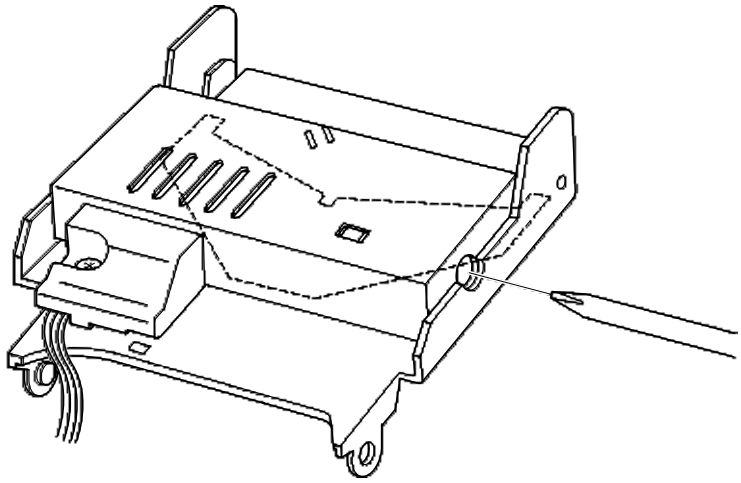


Figure A-3 Autocutter

5) Fine coating (only for model with coating)

5)-1 Cautions on handling fine coating of the case

This printer is housed in a plastic case (*) with a fine coating; simple cleaning is enough to remove dirt easily so that the exterior of the printer remains in good condition. Like other plastic cases, handle the fine coating with care as described below.

(*) The fine coating is not applied to the installation surface of the metal plate and the inside of the case.

[Caution]

- Do not scratch the surface with hard objects; otherwise the case may become damaged and dirt may become difficult to remove.
- Do not use any type of abrasive agent (scouring powders, scouring pads, etc.) to clean the case; otherwise the surface of the case may become damaged and dirt may become difficult to remove.
- Never clean the case with disinfectant, bleach, alcohol, benzene, thinner, chlorine, or ketone; otherwise the dirt may become difficult to remove. Also, they may cause the case to discolor, dissolve, or deform.
- The label may come off the fine coating of the case.

5)-2 Cautions on cleaning the printer

Cleaning frequency

It is recommended that the case of this printer be cleaned approximately once a week. If the case is left uncleaned for a long period, dirt deposited on its surface may become impossible to remove.

Cleaning method

- To avoid electric shock, be sure to disconnect the power cord from the electrical outlet.
- Use a dry cloth to wipe away dirt. If the dirt proves difficult to remove, slightly moisten the cloth with water or a mild detergent solution.

6) Notes on the PAPER OUT LED turning off when the paper FEED switch is pressed

When no paper is detected and the PAPER OUT LED turns on (or flashes), this is the time when the first no paper event is detected by the following detectors.

- With print stop invalid, the paper end detector (PAPER OUT LED turns on and the printer cannot go offline).
- With print stop valid the paper end detector (PAPER OUT LED turns on and ERROR LED also turns on, and the printer goes offline).

When the PAPER OUT LED is lit, pressing the paper FEED switch causes PAPER OUT LED to turn off, and the states of the LEDs on the control panel change as follows:

- If the print stop is invalid and the paper end detector detects no paper, only the POWER LED turns on (same as the normal situation)
- If the print stop is valid and the paper end detector detects no paper, both the POWER LED and ERROR LED turn on (same as the offline situation).

Therefore, in cases where the PAPER OUT LED turns off when the paper FEED switch is pressed, be sure to fully understand the above situations.

The states of the LEDs on the control panel when no paper is detected are listed in the following table.

Detector	Location of detection	LEDs on control panel and printer state		
		Normal	When no paper is detected (first time)	After paper FEED switch is pressed
Print stop invalid	Near end detector (ESC c 4 0)	POWER LED: on ERROR LED: off PAPER OUT LED: off Printer state: online	POWER LED: on ERROR LED: off PAPER OUT LED: on Printer state: online	POWER LED: on ERROR LED: off PAPER OUT LED: off Printer state: online
Print stop valid	Near end detector (ESC c 4 1)	POWER LED: on ERROR LED: off PAPER OUT LED: off Printer state: online	POWER LED: on ERROR LED: on PAPER OUT LED: on Printer state: offline	POWER LED: on ERROR LED: on PAPER OUT LED: off Printer state: offline
	End detector			

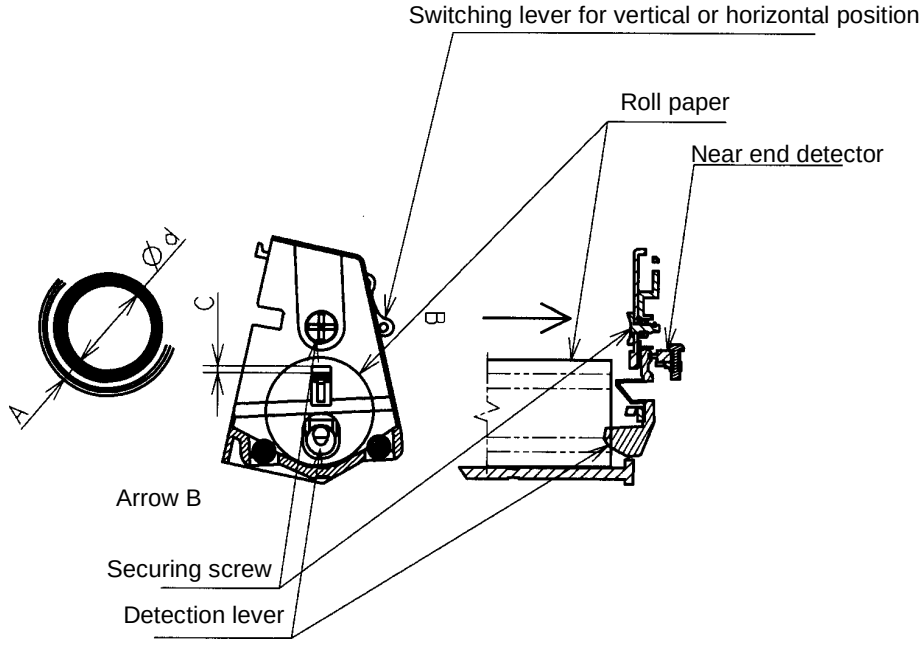
7) Other

Because the printer is made of metal panel with plating, the surface may become rusty.

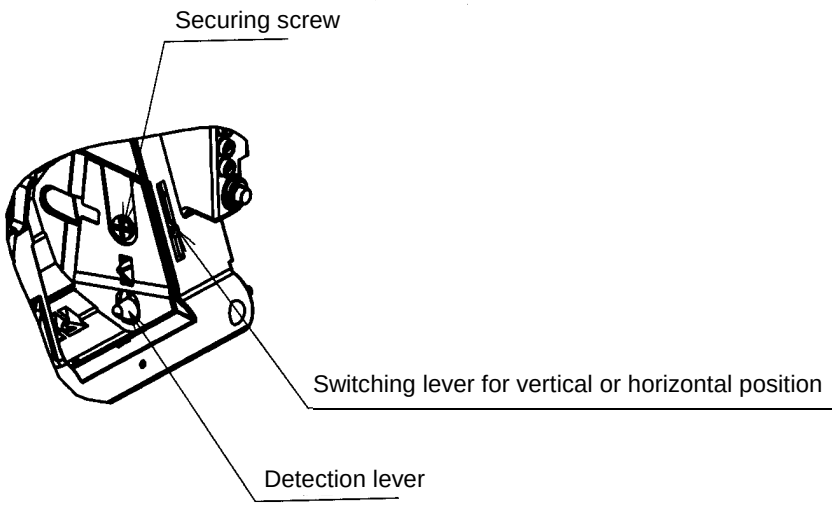
APPENDIX B: REMAINING ROLL PAPER ADJUSTMENT

The total remaining paper varies depending on the inside and outside diameter of the roll core.

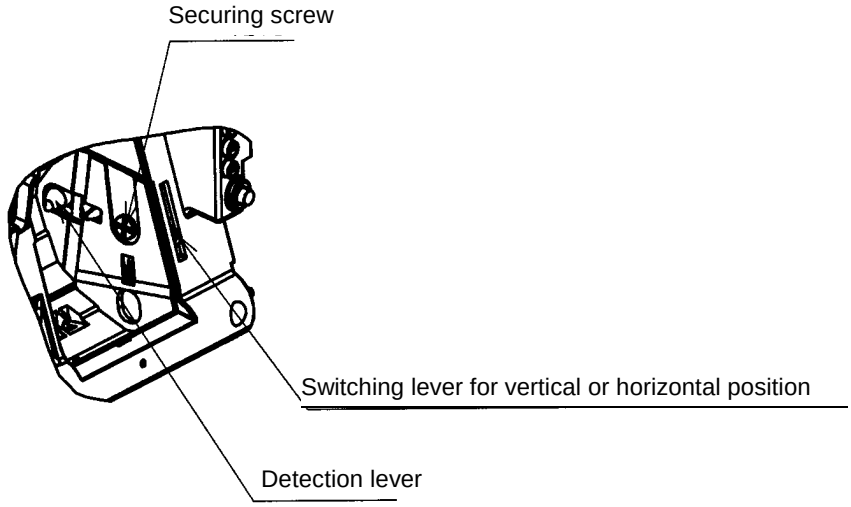
① Inside diameter of roll taken as 10.5 to 12.5 mm {0.41 to 0.49"} (See section 1.4, "Roll supply device," for more details.)



NOTES:
1) The total remaining diameter of the paper roll is calculated $\phi d + (2 \times A)$, but it may vary depending on the machine. (Default value of A is 6 mm.)
2) If the outside diameter of the paper roll is large and the remaining paper is small, the detection level can be adjusted. (The two levels of the setting are selectable and differ by approximately 4 mm {0.16"} in diameter.
   - Loosen the adjustment screw which stops the detector.
   - Raise the detection lever, set C to the gap (2 mm {0.08"}); then tighten the adjustment screw.
3) If the end of the roll paper comes with a red end mark, the end mark may lift up all of the roll paper. In this case, the remaining roll paper as measured by A in Note 1) cannot be obtained.
4) The paper quality may cause the roll paper to become loose and result in incorrect detection.
5) When placing the device horizontally, change the position of the detector to enable correct detection, as follows:
   - Loosen the adjustment screw, which stops the detector.
   - Push in the detection lever.
   - Turn the knob forward until the detection lever is inserted into the other hole.
   - Tighten the adjustment screw.
   - When this is finished, check to see if the detection lever can function smoothly.



Position of detection lever for vertical placement



Position of detection lever for horizontal placement

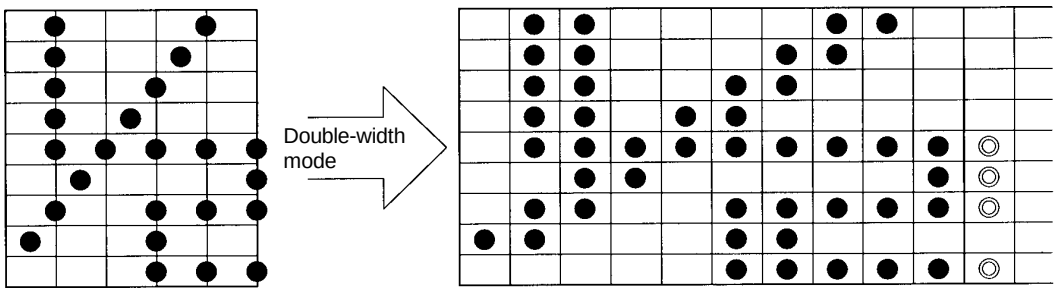
APPENDIX C: NOTES ON CHARACTER PRINTING

The table below applies to user-defined characters and the following characters.

Font	Page	Character code
7 × 9	0	<B0>H, <B2>H
9 × 9	1	<E5>H, <E7>H
9 × 9	0	<B2>H

1) The printer deletes the right-most dots of a character during double-width mode, if another character follows.
   If the characters shown above are double-width enlarged (dots exist in the right-most position), the right-most dots of the enlarged character are not printed, as shown in the figure below.

   Example: 7 × 9 font is selected



◎ dots are not printed when another character follows.
◎ Dots are printed when no character follows. (except ◎ dots on 401st dot position)

Figure C-1 7 × 9 Font

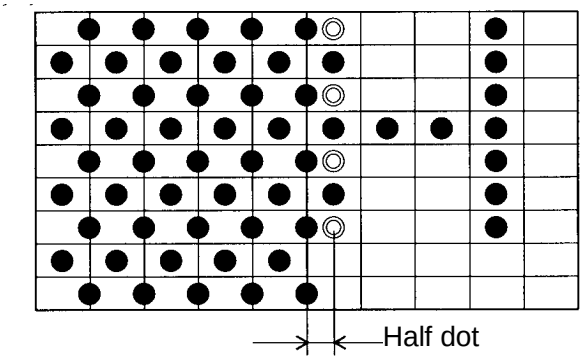
2) The printer cannot print horizontally adjacent half dots. A special procedure that avoids horizontally adjacent half dots is used when print data is buffered in the print buffer. Therefore, some dots in the character that follows the characters prescribed above are not printed because of the effect of the previous dots. Also, when double-height mode is selected, the dots affected by the previous dots are not printed, as shown in the following figure, because double-height processing is carried out during printing after the print pattern is buffered in the print buffer. To avoid this, program the software so that half dots are not adjoined horizontally. (For example, set the right side spacing of a character to 1 or more (**ESC SP**), etc.) In this case the user should note that the total number of dots in the horizontal direction is 400 dots.

Example: If the following codes are transmitted, some dots are not printed.

(Graphic character H<B2> + “H” double-height enlarged)

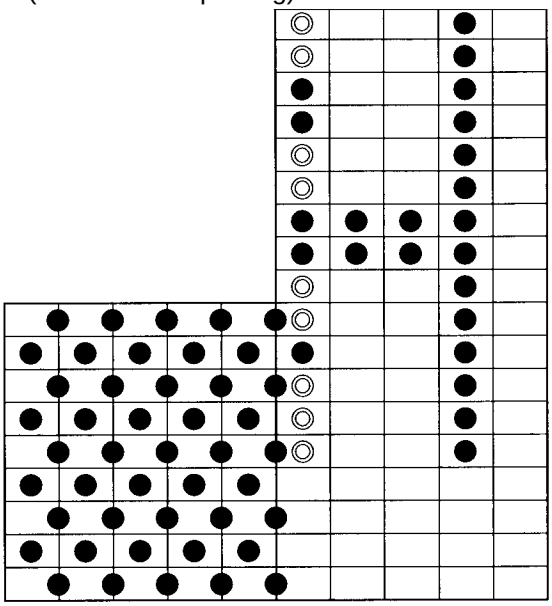
```
PRINT #1, CHR$ (&HB2) ;
PRINT #1, CHR$ (&H1B);"!"; CHR$ (&H11);
PRINT #1, “H”; CHR$ ($HA) ;
```

When the data is buffered in the print buffer



◎ dots are deleted because of the next character and not printed.

Printing result (unidirectional printing)



◎ dots are not printed.

To avoid this, program the software as follows.
(Set the right-side spacing of the graphic character (H<B2>) to 1.)

```
PRINT #1, CHR$ (&H1B) ;” “; CHR$(1) ; CHR$(&HB2) ;
PRINT #1, CHR$ (&H1B);"!"; CHR$ (&H11);
PRINT #1, “H” ; CHR$ ($HA) ;
```

APPENDIX D: NOTES ON USING THE DRAWER KICK-OUT CONNECTOR

1) Drawer specifications (see Section 2.2.3, Drawer kick-out connector)

Drawer specifications differ significantly depending on manufacturer and model number. Make sure that the specifications of the drawer used meet the following conditions when connected to the drawer kick-out connector. These conditions also apply to any equipment (other than a drawer) that is connected to the drawer kick-out connector.

Never use a drawer (or other equipment) that does not meet all of the following conditions:

- The load, such as a drawer kick-out solenoid, must be connected between pins 4 and 2 or pins 4 and 5 of the drawer kick-out connector. (*1)
- When the drawer open/close signal (indicating the state of the drawer) is used, a switch must be provided between drawer kick-out connector pins 3 and 6. (*2)
- The resistance of the load, such as a drawer kick-out solenoid, must be 24 Ω or more or the input current must be 1 A or less. (*3)
- Be sure to use the 24 V power output on drawer kick-out connector pin 4 for driving the equipment. Never connect any other power supply to the drawer kick-out connector. (*4) The peak current is 1 A. See item 2) below for drive signal duty.

NOTES : (*1): Proper operation is not guaranteed with different connections.

(*2): Proper operation is not guaranteed with different connections or connection to a component other than a switch.

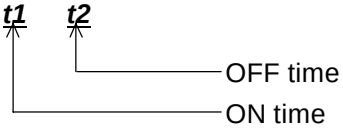
(*3): Connection to equipment whose resistance is less than 24 Ω or less or whose input current is more than 1 A or more may damage the connected equipment as well as the printer.

(*4): Operation is not guaranteed with other power supplies.

2) Notes on the pulse generating command (**ESC p**)

When using **ESC p** to drive the drawer connected to the drawer kick-out connector, set the command parameters to meet the following conditions:

ESC p *m* *t1* *t2*



$$\frac{\text{ON time}}{\text{ON time + OFF time}} \leq 0.2 \quad \text{Formula D-1}$$

$$\text{or, OFF time} \geq \text{ON time} \times 4 \quad \text{Formula D-2}$$

The drive signal waveform generated when the drawer is driven according to the above conditions is shown in Figure D-1.

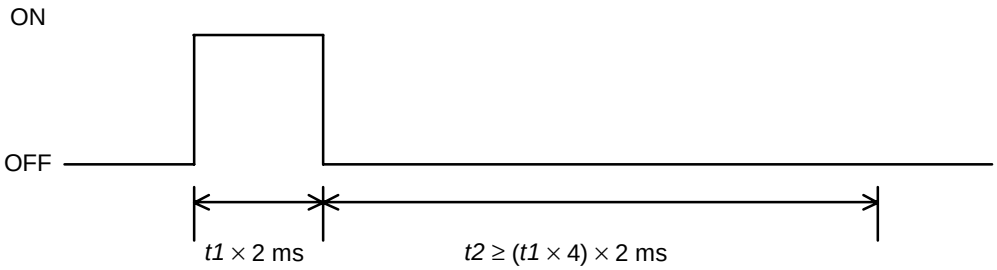


Figure D-1 Drawer Drive Signal Waveform (Formulas D-1 and D-2)

The ON time depends on the specifications of the drawer used. Be sure to check the drawer specifications and set a suitable time. To use a drawer that does not meet the conditions of Formulas D-1 and D-2, see the following section.

3) Using a drawer that does not meet the conditions in 2)

Setting the values of *t1* and *t2* according to the conditions in 2) results in a maximum ON time of 126 ms ($0 \leq t1 \leq 63$), since the setting ranges of *t1* and *t2* are 0 to 255. To use a drawer that requires an ON time exceeding 126 ms, the following conditions must be met:

$$\frac{\text{ON time}}{\text{ON time + OFF time}} \leq 0.2 \quad \text{..... Formula D-3}$$

α: other sequence processing time

NOTE: α is the period when drawer-driving is prohibited from the OFF time until the next ON time.

An example program in which the drawer connected to drive signal 1 is driven with an ON time of 200 ms is shown below.

```
PRINT #1, CHR$(&H1B);"p" ;CHR$(0);CHR$(100);CHR$(250);
GOSUB *WAIT300MS
                                   ON time 200 ms   OFF time 500 ms
*WAIT300MS
      300 [ms]   wait routine      (*1)
RETURN
```

*1 Corresponds to α of Formula D-3. Set the value so that it satisfies Formula D-3 (or include an internal processing time that is equal to or longer than this wait routine).

The drive signal waveform generated when the drawer is driven according to the above conditions is shown in Figure D-2.

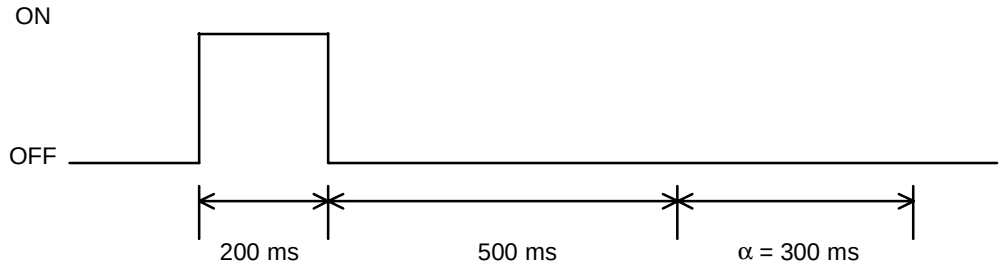


Figure D-2 Drawer Drive Signal Waveform

APPENDIX E: TRANSMISSION STATUS IDENTIFICATION

The values of specific bits are fixed in the status information transmitted by the printer, so that the status bytes of commands can be identified. The user can therefore confirm the command to which the status belongs, as shown in the following table.

When using Auto Status Back (ASB), however, process the consecutive three-byte code (except for XOFF) as ASB data after confirming the first byte of the ASB. Otherwise, the status transmitted by using the **GS I** and the status of the second and following bytes of the ASB cannot be differentiated.

Table E-1 Transmission Status Identification

Command	Status Reply
GS I	<0∗∗0∗∗∗∗>B
GS r	<0∗∗0∗∗∗∗>B
XON	<00010001>B
XOFF	<00010011>B
DLE EOT	<0∗∗1∗∗10>B
ASB (1st byte)	<0∗∗1∗∗00>B
ASB (2nd byte - 4th byte)	<0∗∗0∗∗∗∗>B

When the printer receives a header (<5F>H) transmitted with **GS I *n*** (*n* = 65 to 69), status identification must not be performed until NUL (<00>H) is received.

APPENDIX F: NOTES ON RECEIVING REAL-TIME COMMANDS WHILE THE PRINTER IS BUSY

The real-time command is executed if the real-time commands can be received even when the printer is busy. It depends on the type of interface whether the real-time command can be received or not while the printer is busy.

Table F.1 Receiving Method of the Real-time Command while the Printer is Busy

Type of interface	Receiving method of the real-time command while the printer is busy
Serial interface	The printer can receive the real-time command if the host PC sends the real-time command even though the host PC does not confirm whether the printer is ready to receive or not.
Parallel interface	Impossible to receive the real-time command.
Ethernet interface	The host PC sends the real-time command to the printer directly after the host PC sends the special command which makes the command sending compulsory. (See below for details)

[Specifying the compulsory transmission with the special command]

Protocol: UDP/IP
UDP Port number: 3289

Specifying the compulsory transmission:
Receives the receive character strings after sending the transmission character strings to the printer.
Transmission character strings:
"EPSONC",<03h><00h><00h><15h><00h><00h><00h><01h><01h>
Receive character strings:
"EPSONc",<03h><00h><00h><15h><00h><00h><00h><01h><01h>

Releasing the compulsory transmission:
Receives the receive character strings after sending the transmission character strings to the printer.
Transmission character strings:
"EPSONC",<03h><00h><00h><15h><00h><00h><00h><01h><00h>
Receive character strings:
"EPSONc",<03h><00h><00h><15h><00h><00h><00h><01h><00h>

NOTE: The transmission character strings must be in one packet.